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Personality Factors Associated with Success or Failure on the United States Medical Licensing Examination Step 1 (USMLE Step 1)

Carole Jean Sherva

PERSONALITY FACTORS ASSOCIATED WITH SUCCESS OR FAILURE ON THE UNITED STATES MEDICAL LICENSING EXAMINATION STEP 1 (USMLE STEP 1)

by

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This dissertation, submitted by Carole Jean Sherva in partial fulfillment of the requirements for the Degree of Doctor of Philosophy from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the work has been done and is hereby approved.

(Chairperson)

This dissertation meets the standards for appearance, conforms to the style and format requirements of the Graduate School of the University of North Dakota, and is hereby approved.

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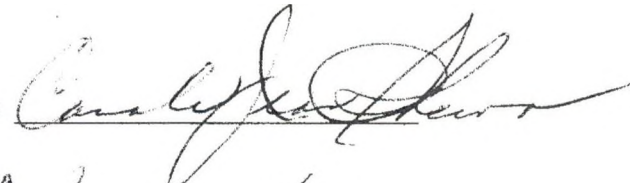
Signature 

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ABSTRACT

Failure of medical students to pass Step 1 of the United States Medical Licensing Examination (USMLE Step 1) can create psychological, academic and financial crises for the students, educational institutions and, ultimately, the public by negatively influencing the cost of health care.

Medical students from the University of Kansas School of Medicine (n=377) and from varying United States of America medical schools enrolled at the University of Missouri, Kansas City, Institute for Professional Preparation (n=109) had participated voluntarily in ongoing research data gathering. Results from this voluntary testing with the Myers-Briggs Type Indicator (MBTI), the Adult Personality Inventory (API) and self-report demographic data questionnaire for Ethnicity/Race and Gender were examined for personality factor variables appearing to be associated with success or failure by medical students on the USMLE Step 1. The goal was to facilitate future targeting of possibly "at risk" students for preventive academic review and psychological bolstering.

Statistical analyses were performed on the data by running contingency analyses, univariate F tests, discriminant function analyses, Chi-square and correlation analyses. Results indicated that subjects who passed the USMLE Step 1 scored higher on the API in the areas of Competitive and Extraverted and lower on Enterprising, while being characterized by the Thinking orientation of the MBTI. Further, those who passed were more likely to be male and Caucasian/White and significantly less likely to be Black.

Those who failed the USMLE Step 1 tended to score higher on the API Enterprising and lower on Competitive and Extraverted, while being characterized by the MBTI Feeling orientation. Additionally, those who failed tended to be Black, female and were less likely to be Caucasian/White. 86.0% of cases were correctly classified by the function.

Suggestions for counseling practice, proactive or immediate interventions, and implications for future research are discussed in light of these results.

DEDICATION

Dedicated to my mentors and friends:

Mary H. McCaulley, Ph.D.

David Secord, D.V.M.

Dedicated to my family:

Jason Sol Parker

David James Parker

Dr. LeRoy and Mrs. Dione Larson

Col. (Ret.) Charles R. and Carla Marie Stevens

Lt. Col. (Ret.) Rhoda U. Jahr

Gilman R. and Cindy Stevens,
Bryana and Vanessa

Carrie Marie Stevens

Jodie Halvorson Holthusen, my Godchild

And to the memory of my parents,

Berna Clarice Seielstad

Chester Orphy Sherva

CHAPTER I

INTRODUCTION AND REVIEW OF THE LITERATURE

Introduction

Successful passage of the United States Medical Licensing Examination (USMLE) is now required for initial licensure in all jurisdictions of the United States except Puerto Rico for graduates of allopathic medical schools accredited by the Liaison Committee on Medical Education (January 8, 2002 conversation with Dr. David Swanson, National Board of Medical Examiners). The first segment, designated as Step 1, is a two-day examination covering coursework in anatomy, behavioral sciences, biochemistry, microbiology, pathology and physiology together with such interdisciplinary topics as nutrition, genetics and aging (O'Donnell, Obenshain & Erdmann, 1993).

Passing Step 1 is often required by medical schools before assignment of the medical student to clinical rotations (Barzansky, Jonas & Etzel; 2000; Barzansky, Jonas & Etzel, 1997). Failure on this exam, therefore, puts the student's entire medical education "on hold" until passage is accomplished. This disruption may create psychological distress for the student, affecting his or her self-esteem, self-awareness and self-image. Further, additional monies may become necessary to finance extended living expenses plus any remediation costs and decreasing amounts of monies would be

available due to loss of scholarships or other stipends. A time warp of 6 months or more occurs in the progression of studies. In addition, the government or other subsidizing body accrues significant financial losses from scholarships and grants paid directly to the students who subsequently fail or quit. The government and others also provide research grants, low interest loans for expansion or maintenance to the institutions to promote their educational efforts. The medical institution suffers in loss of caliber of reputation as a provider of professional medical education due loss of these subsidies and due to problems including operational difficulties arising from changes in class sizes and clinical rotation groupings, plus professor to student ratios. The loss in reputation then leads to being less able to attract high caliber students, which creates less inclination for outside financial sources to invest in the institution. The ripple effect continues outwards until the consumer is affected. Ultimately, we all pay the price for inefficiency.

Failure on Step 1 has significantly more impact upon the institution's well-being since Step 2 primarily covers conceptualization of the wellness or illness entity, entailing diagnosis, prognosis, any disease mechanism and medical care or preventive measures (O'Donnell, Obenshain, and Erdmann, 1993). USMLE Step 2 traditionally follows clinical experience, placing its administration at the completion of the medical school program and prior to residency training. Therefore, failure on Step 2 would not create problems in the institution arising from the absence of the medical student's physical presence.

Given recent and growing concerns in the health care field about the cost-effectiveness and the expenses incurred in educating medical doctors, researchers have

reported interest in many areas, including the use of recommended standardized methods of assessment to evaluate student performance, tracking faculty and minority student increases or decreases, plus the presence of new content, such as alternative medicine, competency training for working with minorities and challenged clients and new methods of instruction such as computer-based learning (Barzansky, Jonas and Etzel, 2000). Dr. Jerry Colliver's (2000) review of the literature on problem-based learning (PBL) revealed no convincing evidence that PBL improves the medical student's knowledge base or clinical performance sufficient to justify the significant financial outlay required. A diverging viewpoint was given by Blake, Hosokawa and Riley (2000) who reported that the PBL format produced higher mean scores on the USMLE Step 1 versus those achieved by Flexnerian (traditionally) taught students in the United States and Canada. However, Drs. Albanes and Mitchell refute the efficacy of PBL based upon their extensive literature review spanning the years from 1972 to 1992. In comparison with traditional learning, they concluded that the PBL format is more nurturing and enjoyable but is overshadowed by reverse processing for cognitive reasoning in the students and, again, by the high costs involved. Lynch, Woelfl, Steele and Hanssen (1998) have found that performance on the USMLE Step 1 and other objective measures of academic achievement is influenced by learning style.

One method for accomplishing this assessment of students and tracking of changes within the medical education environment is to study the personality factors, which may differentiate between the medical students who are successful and those who fail on the licensing examination. The current study was designed to examine

personality characteristics, as measured by the MBTI and the API, as possible predictors for success or failure on Step I of this crucial test. The results could then be applied toward benefiting the training and success of medical students, for example, by targeting the students at risk to fail so a preliminary review program could be initiated for them to forestall failure and, thus, eliminate psychologically and financially expensive post-test remediation for academic, financial and psychological distress (Hendron, 1988, Zeldow, Daugherty and McAdams, 1988).

By utilizing the trait-factor theory and the Myers-Briggs Type Indicator (MBTI) (Myers, 1962) for personality type, which is grounded in Jungian psychology, some of the psychological and demographic factors were evaluated for influencing the medical student's success or failure on the USMLE Step I. In addition to the MBTI, the Adult Personality Inventory (API) was employed as a possible key to awareness of relationships that lead to success or failure on the exam. Based upon the original items of the 16PF (which is founded in the trait-factor theory and was created by Cattell, 1957), the API also includes elements of the trait scales from: the IPAT Anxiety Scale (1957); the High School Personality Questionnaire (1958); the Children's Personality Questionnaire (1961), the Neuroticism Scale Questionnaire (1961), the Early School Personality Questionnaire (1966), the Clinical Analysis Questionnaire (1970), and the Child Anxiety Scale (1978) (Krug, 1984).

The present study was designed to study personality characteristics, as measured by the API and MBTI, and possibly impacted by the demographical factors of Ethnicity/Race and Gender for any relationship to success or failure on the USMLE

Step1. Significances could then be evaluated and interpreted for implementation within medical education. The premise is that these implementations could then place counseling psychologists in the proactive role of helping targeted medical students who may be at risk to fail USMLE Step 1. This a priori awareness would create an opportunity for medical school educators and students to then examine for weak knowledge areas and utilize pre-test interventions such as FirstPrep, a 6 week intensely structured program of coursework review combined with strengthening test-taking skills (Blanc, 1992). FirstPrep is the proactive version of the professional preparation program, as compared to the varying length versions of the remedial Board Prep programs created and administered at the University of Missouri, Kansas City, Institute for Professional Preparation division (Blanc & Martin, 1984).

In summary, the medical student's success or failure in medical school and on the U.S. Medical Licensing Examinations (USMLE) influences the cost effectiveness of the medical student's training and, eventually, the cost of health care itself. Counseling psychologists can assist the student, the institution and, ultimately, the public, by utilizing their extensive background preparation in testing, education, vocational counseling and psychotherapeutic intervention to facilitate success in medical education programs.

Review of the Literature

Counseling Psychology in the Health Care Field

Historically, counseling psychologists have contributed to the medical and health care literature (Kaplan, 1991), acting as investigators/scientists to identify and evaluate

new factors, and as clinicians and/or practitioners to apply their knowledge and skills (Bohart & Todd, 1988, Corrigan, 1991; Patton, 1992; Tanney, 1991).

Alcorn, Altmaier, and Harris (1991) noted a growing emergence in the health field of a biopsychosocial model conceptual approach towards health and illness. The term health psychology defines the current practice within the perspective and profession of psychology and describes its scope within the broad spectrum of health (human and environmental), including wellness and preventative activities, psychobiological effects, health or illness factors, and factors or conditions under which a person utilizes and benefits from health care services (Ardel, 1977; Benner, 1985). Since current emphasis is on reducing the costs for health care, counseling psychologists can help by keeping people healthy and avoiding expensive services (Kaplan, 1991).

Thoresen and Eagleston (1985a, 1985b) contended that counseling psychologists and physicians could collaborate to cope with the clinical demands of the health profession, including the design, implementation, and evaluation of treatment programs. Blocher (1981) advised that, because of dissatisfaction with traditional theories and delivery models in the mental health field, counseling psychologists can make significant contributions to many areas, including human cognition and development, human learning and behavioral change, human communication and interpersonal behavior, optimal person-environmental fit, and psychoeducation (see also DeLeon, Frank & Wedding, 1995; Ford, 1985; Hollandsworth, 1985; Iscoe, 1982; Klippel & DeJoy, 1984; Myers, 1982; Watkins, 1985). Additionally, Stone, Cohen and Adler (1979) identified several categories within the realm of psychology in the health system: (1)

psychobiological study, which addresses the effects of behavior on body tissues and processes and the effects of abnormal body function on behavior; (2) health behavior, including all behavior in well or ill persons that has immediate or delayed effects on their health, such as exercise, personality and coping styles, sick role behavior, various stressors, recent life changes or drug use; and, (3) the health process from the perspective of the health care system, including such issues as treatment methods, therapeutic relationships, doctor-patient relationships, diagnosis and medical decision-making, and health equipment and settings.

The research study being presented here seems most closely affiliated with exploring within the health behavior realm, as the author assesses medical students for personality styles associated with success or failure on the United States Medical Licensing Examination Step 1. The results from administrations of the Adult Personality Inventory and the Myers-Briggs Type Indicator are combined with certain demographic variables, which are then statistically analyzed and discussed.

The Trait-Factor Theory of Personality

One of the key theoretical foundational tools of counseling psychology is the trait-factor theory. Trait-factor theory's primary emphasis has been upon the correspondence between one's traits and one's work environment (Dawis & Lofquist, 1984), including Holland's theory and that of Chartrand (1991). Gilliland, James, and Bowman (1994, p. 356) advised, "Work content and personal preferences influence one's cognitive appraisal and coping resources, which in turn influence individual adaptation such as performance and well-being." In addition, Moos (1987) proposed three major social dimensions,

which have influence: relationships and involvement with other people; personal growth when applied to goals, and maintenance and change in the setting. In addition, Rounds, Dawis, and Lofquist (1987) suggested a correspondence between work abilities and work ability requirements which would be predictive of worker satisfaction, using the assumptions that people are rational, that reliable assessment of individual differences can be made, and matching persons and environments can increase the predictability of positive outcomes.

Frequently utilized by counseling psychologists to study personality, the trait-factor theory (also called the Minnesota point of view, differentialist, directive, and decisional theories) goes back to the late nineteenth and early twentieth century, with Galton's empirical and systematic attempts to measure differences in individual capacities and aptitudes, Binet's and Cattell's investigations of differential prediction of intelligence, and Munsterberg's utilization of individual differences in industrial applications (Gilliland, James, & Bowman, 1994). The classic trait-factor approach, proposed by Donald Paterson, John Darley and E.G. Williamson in the late 1930's, combined the earlier works with Frank Parsons' theories of vocational guidance (Williamson, 1972) to suggest that individuals possess relatively permanent personality traits which can be matched with the best suited occupation to achieve vocational success.

The Trait-Factor Theory, Cattell and the Adult Personality Inventory

The use of factor analysis in psychology started with Spearman in 1904 with his work on the nature of intelligence, and two of his students, R. B. Cattell and H. J. Eysenck, who were major contributors to the factorial analysis of personality traits

(Cattell, 1957). In addition, in 1934, Guilford studied the Jungian concepts of introversion and extroversion, resulting in the Guilford-Zimmerman Temperament Survey, in which 10 personality traits were identified (Gilliland, James & Bowman, 1994).

Cattell went on to study temperamental traits, including reducing a list of 4,500 descriptive adjectives (compiled by Allport & Odbert in 1936) to 46 surface traits (Cattell & Kline, 1977). After examining real-life data, questionnaires, and test data based upon these traits, he further reduced the surface traits to 16 temperament source traits, which formed the basis for the Sixteen Personality Factor Questionnaire (16PF) (Cattell, Eber, & Tatsuoka, 1970, Cattell, Saunders, & Stice, 1950). The sixteen factors included: sizia (reserve) vs. affectia (outgoingness); intelligence; ego strength (emotional stability); submissiveness vs. dominance; desurgency (taciturn) vs. surgency (enthusiastic); superego strength (expedient vs. moralistic); threctia (shy) vs. parmia (venturesome); harria (toughminded) vs. premsia (tender-minded); alaxia (trusting) vs. protension (suspicion); praxernia (practical) vs. autia (imaginative); alertness (forthright) vs. shrewdness; guilt proneness (self-assured vs. insecure); conservatism vs. radicalism; group-adherence vs. self-sufficiency; strength of self-sentiment (careless of social rules vs. controlled); and ergic tension (relaxed vs. tense) (Cattell & Kline, 1977).

Cattell also addressed the issues of dynamic traits, which fell into three categories: strength of interest traits related to the Freudian concepts of id, ego, and superego; basic drives or ergs, such as fear, sex, exploration; and sentiments (environmentally based interests) (Cattell & Kline, 1977). In addition, he felt that variations occurred daily due

to state changes, including exvia (extroversion), anxiety, depression, arousal, fatigue, guilt, stress, and regression (Curran & Cattell, 1974).

Paterson and Darley then began to apply knowledge of the foregoing traits and factors, along with psychological tests, case histories, educational and vocational training, and placement services, in an attempt to place people in jobs (Williamson & Biggs, 1979). As a result, trait-factor counseling theory was created for the purpose of defining human behavior by specific traits, such as aptitudes, achievements, personalities and interests, which then could be integrated to form constellations of individual characteristics called factors. The theory, founded from a vocational perspective, also developed as a student personnel program in the university setting, and much of the trait-factor counseling practices are based upon the vocational and educational counseling of students (Gilliland, James, & Bowman, 1994).

Many school, vocational, and rehabilitation counselors continue to practice the trait-factor approach, and utilize aptitude, personality, interest, and occupational assessments formulated by the trait-factor approach. Offshoots include the theory of work adjustment (Dawis & Lofquist, 1984), and the cognitive information processing approach by Peterson, Sampson, and Reardon (1991) and Chartrand(1991) proposed the person-environment fit approach, which acknowledges the utility of traits for predicting occupational behavior, and the dynamic interaction between persons and environment. John Holland's theory (Holland, 1973) involving six personality types is a primary impetus in vocational counseling, beginning with his Self-Directed Search (Anastasi, 1982), which was then incorporated into what is currently known as the Strong

Vocational Interest Blank – Strong Campbell Interest Inventory (SVIB-SCII) (Hansen & Campbell, 1985). The overlapping of the development of awareness of particular elements within the successive theorists' domains has been exposed and explored by successive analysis, as related by Ahadi in 1991, who empirically confirmed a link between Holland's typology and Dr. Samuel E. Krugh's Adult Personality Inventory (API) scales.

Identified as "a modern version of the 16PF" (Bolton, 1985), the Adult Personality Inventory (API) was created by Dr. Samuel E. Krug, "for analyzing and reporting individual differences in personality, interpersonal style and career/lifestyle preferences" (Krugh, 1996, p.5). The API evolved following extensive factor analysis of Cattell's core personality constructs. The results provided the impetus for development of a psychological instrument, which would reflect these major personality dimensions. yet provide an increased awareness of the underlying dynamics in a more easily utilized and understood form. The current version, consisting of 324 items, is a self-report inventory used to assess normal-range personality characteristics in adults (Krug & Ahadi, 1990). It has primarily been used in individual and family counseling, employee selection and placement, and personnel development programs (Krug, 1991, Krug & Johns, 1990). Werner and Pervin (1986) described four domains used to describe the assessment level of items in major personality questionnaires: (1) cognitive-beliefs, opinions; (2) affective preferences-likes, dislikes, wishes; (3) affective reactions-emotions, and (4) behavioral activities. They believed that the 16PF was evenly balanced across the categories. Norms for the API are based upon a sample of 1,000

adults who completed the 16PF at the same time, allowing the API scales to be equated to those of the 16PF, which adds to the normative basis of the API (Krug, 1984).

The API also incorporates elements of the trait scales from: the IPAT Anxiety Scale (1957), the High School Personality Questionnaire(1958), the Children's Personality Questionnaire (1959), the Neuroticism Scale Questionnaire (1961), the Early School Personality Questionnaire (1966), the Clinical Analysis Questionnaire (1970), and the Child Anxiety Scale (1978) (Krug, 1984).

Structurally, the API is like the 16PF, which is based upon personality traits defined in Cattell's theory. The API differs in that the author increased the number of cognitive (interpretive) or belief system domain items from 13 to 30. This enhanced the predictive power. These items assessed verbal ability, verbal reasoning, and numeric ability. Also, a standardized set of response options was introduced ("Generally True," "Uncertain," "Generally False"), which had the effect of making the choices easier to understand and the items shorter (Krug, 1991). In a study comparing the difficulty level of the API items with those of the 16PF, the API items were found to be significantly easier to answer (Krug & Ahadi, 1990). Intelligence items were also separated from personality items and given their own set of directions.

The API profile consists of scales for seven personal characteristics, eight interpersonal styles, and six career preference factors. It also retains precise links with the 16PF and the underlying personality model on which the 16PF is based. A joint factor analysis of the two instruments confirmed that they were structurally identical (Krug, 1984, 1991).

Three sets of API scales are derived, as shown below with definitions of assessment criteria and with range examples (Krug, 1996).

The Personal Characteristics scales correspond to the second-order structure of the 16PF trait scales and are similar to factors believed to represent the most important dimensions of personality, as follows.

1. Personal Characteristic scales (7):

Extroverted – quality and intensity of interpersonal interaction, activity level, need for stimulation and capacity for joy

High = outgoing, sociable, good communicator, team player, uninhibited, likes variety, acts quickly, dislikes detail, ideas from discussion, results-oriented.

Low = reserved, shy, task-oriented, works well alone, unassuming, concentrates well, likes detail work, regular work routine, ideas from reflection.

Adjusted – emotional stability and tolerance of stressful situations

High = stable, calm, secure, unfrustrated, emotionally mature, adaptable, resilient, relaxed, hardy, self-assured, unafraid of conflict

Low = tense, anxious, easily upset, self-conscious in groups, copes poorly with stress, moody, unhappy, irritable, dissatisfied, self-doubting, insecure, impulsive, guilt-prone, poor control over feelings.

Tough-Minded – how people make decisions

High = rational and objective look at situation, task-oriented rather than people-oriented, insensitive to others, emotionally detached, aloof, conventional, impolite, uncooperative.

Low = emotions may sway judgment, intuition used for problem-solving, sensitive, kind, likes harmonious relationships, good at seeing effects of work decisions on people, dislikes giving direct criticism.

Independent – self-reliance and self-sufficiency

High = strongly self-directed, self-sufficient, likes responsibility, authority, risk=taker, doer, aggressive, shows initiative, results-oriented, confident in own skills, dislikes mediocrity.

Low = dependent, passive, seeks support from others, team player, adapts, warm, trusting, dependable, undemanding, cooperative, tolerant.

Disciplined – self-control and level of persistence

High = controlled, careful, self-disciplined, organized, respectful, strong sense of duty, complies with rules, lacks spontaneity, persistent, dependable, conscientious.

Low = lack self-control, persistence, careless, impulsive, changes goals and interests often, dislikes structure, risk-taker, individualistic, spontaneous.

Creative – imagination, unconventionality and innovativeness.

High = imaginative, sensitive, liberal, intelligent, sees big picture, work in bursts of energy, intuitive, can overcomplicate, bored by routine

Low = practical, down-to-earth, pleasant, companionable, good-natured, focuses on what works now, works steadily, sticks to tried-and-true methods.

Enterprising – individual's drive and ambition

High = adventurous, dominant risk-takers, achievement and results-oriented, competitive, not happy with status quo.

Low = satisfied with status quo, lack ambition for challenges, not success-oriented, undemanding, disorganized, tender, jovial, content with life.

The eight Interpersonal Style scales are based upon Cattell and Murray's trait system, a structural model for many different theories of interpersonal behavior (Freedman, 1985; Krug, 1984; LaForge, 1985; Wiggins, 1979, 1985).

2. Interpersonal Style scales (8): how a person is likely to relate to others across various situations

Caring –

High = accept others openly and unconditionally, companionable, sympathetic, cheerful, approachable, forgiving.

Low = aggressive and uptight, distant, wily, cruel, exploitative, unsociable.

Adapting –

High = submissive and group dependent, meek, undemonstrative, nonargumentative, self-effacing, sensitive to group pressure.

Low = difficulty accepting demands placed on them by others, domineering, wily, boisterous, dominant, cocky.

Withdrawn –

High = insecure in social situations, bashful, uncalculating, disorganized, accommodating, undemanding, self-effacing.

Low = self-confident, persistent, dominant, extroverted, ruthless, industrious, assertive, outgoing.

Submissive –

High = need support and approval of others, insecure, tense, frustrated, moody, inhibited, unproductive.

Low = verbally convincing, self-disciplined, self-confident, calculating, assertive, steady, firm.

Uncaring –

High = don't relate easily to others, distant, hostile, domineering, cunning, critical, angry.

Low = accepting of others, shy, companionable, sympathetic, approachable, steady, forgiving.

Non-Conforming –

High = aren't constrained by rules, rebellious, forceful, impractical, sensation seeking, narcissistic, uncontrolled.

Low = content to follow, don't rebel, non-egotistical, undemonstrative, nonargumentative, organized, silent.

Sociable –

High = outgoing, open, dominant, self-confident, vivacious, cheerful, assertive, flaunty.

Low = not highly cheerful or confident, silent, distant, undemonstrative, introverted, timid, reticent.

Assertive –

High = take-charge attitude, companionable, firm, self-assured, industrious, approachable.

Low = overly shy in new social situations, bashful, undemonstrative, unproductive, introverted, unsociable.

The six Career/Lifestyle scales relate to job satisfaction and lifestyle preferences. These scales are especially helpful for individuals who are in the first stages of career planning, when the importance of personality based information is the greatest in assisting the discovery of satisfying occupational contexts, and the development of educational plans which will enable them to enter those contexts and achieve their full potential (Ahadi, 1991; Krug, 1984, 1991).

3. Career/Lifestyle Factors (6) – work-setting preferences

Practical -

High = attracted to functional aspects of work, down-to-earth, confident, self-sufficient, domineering, disrespectful, extroverted.

Low = prefer solitude, concerned about other's opinion of them, disorganized, timid, self-absorbed, unproductive, self-doubting, introverted.

Scientific –

High = problem solvers, intelligence, self-disciplined, deliberate, persistent, self-assured, ruthless, boisterous, exploitative.

Low = shy, unaggressive, uncalculating, accommodating, unproductive, undemanding, tender, self-effacing.

Aesthetic –

High = like creativity, sensitive, tenderhearted, courteous, self-doubting, intelligent, persevering, intuitive.

Low = handy with tools, cunning, self-effacing.

Social –

High = like working with people, approachable, trusting, charitable, sympathetic, industrious, enthusiastic.

Low = prefer solitude, impersonal, unaggressive, meek, unproductive, unrevealing, lazy.

Competitive –

High = like commercial aspects of work, stable, undeceptive, outgoing, pleasant, assertive, vivacious.

Low = difficulty finishing routine jobs, shy, unauthoritative, undemonstrative, unproductive, self-doubting, introverted.

Structured –

High = like detail, cooperative, modest, companionable, industrious, organized, conservative.

Low = sees self as impractical and disorganized, ungracious, presumptuous, coldhearted, boisterous, withdrawn, lazy.

There are separate norms for men and women as significant differences have been found. Men tend to score significantly higher than women do on Extroverted, Adjusted, Disciplined, Enterprising, Assertive, Scientific and Social scales (Krug, 1984). The API contains four validity scales, which include Faking Good, Faking Bad, Infrequency, and Uncertain scales. The API can be computer scored (Krug, 1985).

The Trait-Factor Theory, Jung, and the Myers-Briggs Type Indicator

The trait-factor theory is part of the basis of the personality exploration tool, the Myers-Briggs Type Indicator, which was also developed partially from Jungian theory personality types (Croom, Wallace & Schuerger, 1989, Nystul, 1993). In his review of the Myers-Briggs Type Indicator, Devito (1985) describes this test as an attempt to "capture" the Jungian personality in a psychometric instrument. According to Jung, the term "type" is given to a number of peripheral characteristics organized into larger units that relate to commonly encountered ways of life. The concept of type has the function of subsuming and grouping together the peripheral characteristics into meaningful patterns (Maddi, 1989).

Freud and Jung are both "type theorists." Freud described four character types composed of traits that are expressive of the activities and conflicts of Freud's psychosexual stages of development and the defenses common to those stages.

Jung, on the other hand, developed a comprehensive theory to explain the pattern that he saw in human behavior. Carl Jung, in 1921, published a book that outlined a theory that suggested that human behavior was not random and disorderly, but was rather consistent and orderly as defined by the manner in which individuals prefer to perceive and make judgments. He described these individual patterns as psychological types (Jung, 1971). His most significant contributions included the concepts of the extrovert and introvert; the four functions of thinking, feeling, sensation, and intuition; and, the concept of primordial archetypes (Patterson, 1986; Sahakian, 1969).

According to Jung, individuals must become individualized, transcendent and come to grips with the unconscious forces of their personality by integrating a variety of forces, traits, and attitudes, resulting in transformation and change in their personality (Gilliland, 1994). Gilliland further relates, "The approach has also been the proving ground for developing and using the MBTI as an understandable and positive way of viewing and examining the personality. The extensive use of the MBTI has given impetus and encouragement to many therapists and lay people who like to have concrete and definitive descriptors for themselves" (p. 114).

Jungian theory categorizes attitudes (extroverted, outgoing and gregarious, versus introverted, shy and introspective), and functions (thinking, feeling, sensation, and intuition) which further differentiate the personality type (Jung, 1971). The functions are divided into two pairs: sensation vs. intuition, and thinking vs. feeling (Jung, 1971). Sensation is the perceptual function, which focuses on the real world through the five senses, while intuition perceives the world through flashes of insight and impressions, which have some basis in reality (Hall, 1989). Thinking and feeling classify the third and fourth functions. Thinking classifies data into logical and discreet categories while feeling classifies input into pleasant or unpleasant categories within a value structure. Gradually, one function will assume a superior role, while the other assumes an inferior role in the personality (Smith and Vetter, 1991).

Jung (1971) combined the extroversion-introversion attitudes with the perceptive dimension (sensing and intuiting), and the judgment dimension (thinking and feeling)

into eight basic personality types. Then paired into four sets of polarities, these are summarized by Maddi(1989) as follows:

Introversive-rational: oriented toward the inner world of ideas and emphasizing either the rational process of thinking or feeling.

Extroversive-rational: oriented toward the outer world of people and things, and emphasizing either the rational process of thinking or feeling.

Introversive-irrational: Oriented toward the inner world of ideas and emphasizing the irrational process either of sensing or of intuiting.

Extroversive-irrational: Oriented toward the outer world of people and things, and emphasizing the irrational process either of sensing or of intuiting.

In addition, Myers (1962) added the dimension of the polarity of judging (J) versus perceiving (P) to the Jungian theory: "The judging attitude focuses on a willingness to make prompt decisions, come to conclusions, and excludes the use of the perceiving function" (Willis, 1984, p. 483). Conversely, a preference for the perception attitude means resisting making a decision while gathering more information and simultaneously excluding the judging functions. The primary purpose of this function is to determine which one of the individual's two function preferences is dominant and which is auxiliary. For example, an ESTP individual and an ISTP individual both prefer the perception (P), indicating a preference for curiosity, spontaneity and openness to the environment, and both would prefer to come to decisions slowly and deliberately. However, the choice of (P) also indicates that the sensing (S) perception is extroverted in both types. For the ESTP, the extroverted attitude is preferred and the ESTP is described

as an extroverted sensing type, with thinking as auxiliary. On the other hand, the ISTP, being an introvert, the auxiliary function is extroversion, leaving the thinking (T) to be dominant and introverted. The ISTP is, therefore, described as the introverted thinking type with sensing as auxiliary (Willis, 1984, Willis & Ham, 1988).

The addition of the judging (J) and perceiving (P) indexes to the eight Jungian personality types increased the possible types to sixteen, including:

Introversive-rational: Oriented toward the inner world of ideas and emphasizing either the rational process of thinking or feeling with the irrational process of sensing or intuiting as auxiliary with the perceptive index dominant produces the types ISTP, INTP, ISFP and INFP.

Extroversive-rational: Oriented toward the outer world of people and things, and emphasizing either the rational process of thinking or of feeling with the irrational processes of sensing or intuiting as auxiliary with the perceptive index dominant produces the types ESTP, ENTP, ESFP, and ENFP.

Introversive-irrational: Oriented toward the inner world of ideas and emphasizing either the irrational process of sensing or of intuiting with the rational processes of thinking or of feeling as auxiliary with the judgment index dominant produce the types ISTJ, ISFJ, INTJ, and INFJ.

Extroversive-irrational: Oriented toward the outer world of people and things, and emphasizing either the irrational process of sensing or of intuiting with thinking or feeling as auxiliary with the judgment index dominant produce the types ESTJ, ESFJ, ENTJ, and ENFJ (Maddi, 1989; Myers, 1993; Myers & McCaulley, 1985).

The Myers-Briggs Type Indicator (Myers & McCaulley, 1985), which includes the Jungian typology, is used to investigate ability, information, adjustment, and personality variables, and is especially useful in assisting the individual with self-understanding (Smith & Vetter, 1991). It is used in industrial and organizational psychology, life span issues, the ministry, marriage and family counseling, and career counseling (Fuller & Kendall, 1992; McCaulley & Morgan; 1982,McCrae & Costa, 1989).

Utilizing the trait-factor theory of counseling and assessment, including the MBTI, the counselor can then differentiate among presenting problems, set priorities among goals, assess resources and stressors that could foster or inhibit progress, help the student understand him/herself, and suggest remedial steps to be taken if necessary to reach his/her goals (McCaulley, 1978,1981, 1987,1990; McCaulley & Morgan, 1982).

The Trait-Factor Theory and Personality Characteristics in general college students

Significant work has been completed regarding the trait-factor theory in post-secondary education, including a landmark study by Lehmann (1965) where 2,746 Michigan State University students were administered a battery of personality and cognitive tests. Controlling for cognitive factors, significant differences were found on the affective dimensions. Osipow (1968) and Osipow, Ashby and Wall (1966) found that college students chose major fields of study consistent with their different personality types. In addition, in 1967, Elton, after administering the Omnibus Personality Inventory, found that several personality differences existed among major fields of study. Additional studies revealed personality differences among students majoring in physical

sciences, humanities, education, nursing, engineering, biology, zoology, physiology, chemistry, physics, and astronomy (DeVogue, 1975; Folsom, 1969; Hockert, 1975; McCaulley, 1977; Williams, 1972).

The Trait-Factor Theory and Personality Characteristics in Allied Health College Students

In the health care field, much of the trait-oriented research at the post-secondary level is homogeneous in sampling, describing occupational therapy students (Christensen, 1976; Davidson, Christiansen & Dillon, 1982); dental students (Meier & Sardi, 1970); physical therapy students (Wellock, 1975); clinical dietitian students (Cleveland, 1961); medical technology students (Dietrich & Doren, 1979; Gleich, 1978; McCune & Rausch, 1969; Youse, 1977; Zufall, 1976); nursing students (DeWever, 1972; Gynther & Gertz, 1962; Healy & Borg, 1951; Hogan, 1971; Mariner, 1977; O'Neill, 1975; Smith, 1968; Zurhellen, 1978) and dental hygiene students (Frank & Kirk; 1970, Sylvester, 1979). Anderson and Barry (1965) compared occupational therapy, physical therapy and medical technology students on the Minnesota Multiphasic Personality Inventory (MMPI) and found no significant differences; but the results may have been invalid because the MMPI was not standardized on a non-clinical sample.

Bergman, in 1974, while studying students in the major fields of nursing, physical therapy and medical technology, found that there were differences in the personality profiles, and that the medical technology students were more interested in the non-judgmental discovery of truth, through empirical, critical and rational, and desired order and systematized knowledge. They tended to be more task oriented, as well. In a

major study (1967-1971) involving 1.3 million college freshmen, Engin Holstrom studied the personality differences in those who had shown an interest in a health-related major field, including medical students. Holstrom (1975) concluded that demographics, socioeconomic background, academic ability, self-image and values influenced the student's major, career choice, and choice of specialty.

Rezler and French (1975) compared a number of health major fields of study, including medical art, on the four scales of the Myers-Briggs Type Indicator. They concluded that: all six groups showed higher Feeling (F) versus Thinking (T) scores; that, except for occupational therapy, the Judging (J) function was preferred over Perception (P); and there was an equal balance between extroverts and introverts. However, they also found that the medical technology group was more introverted, practical, fact-oriented, and desired a planned, orderly way of life.

In a study of female students in health majors, Rezler and Buckley (1977) found that medical students were different from occupational and physical therapy students, with medical students revealing a greater desire for thinking analytically rather than basing decisions in their approach to work and people on personal feelings and values. Medical, medical technology, dietary and pharmacy students preferred a Judging (J) attitude, with well-planned, routine work in contrast to occupational therapy students who liked changing situations and flexibility. However, it was also found that there was a wide range of type within groups.

In a study requested by the Department of Health, Education and Welfare, McCaulley (1978) compared students in 16 allied health major fields of study to a general

college population and to a combined group of students and practitioners in the health fields. Using the Myers-Briggs Type Indicator, she concluded that the medical technology students were more Sensing, Introverted, Thinking and Judging types than both the general college population and the combined group of students and practitioners.

During the late 1970's, the Center for Applications of Psychological Type published a final report of research that had been done for the Division of Medicine, Bureau of Health Manpower, Health Resources Administration, U.S. Department of Health, Education and Welfare. The final report consisted of three parts, entitled Monograph I (McCaulley, 1983a), Monograph II (McCaulley, 1983b) and a CAPT Bibliography for the MBTI (1995). The two monographs describe some applications of the Myers-Briggs Type Indicator to medicine and the other health care professions. Monograph I presented an overview and state of the art for the health professions.

According to McCaulley (1983a), any research with the MBTI includes implicit expectations of type differences. Predictions utilized in Monograph I relative to understanding health professions are given below:

a) EI Predictions:

1. Extraverts will be attracted to fields and specialties with high levels of interpersonal contact, and/or requirements for rapid actions and responsiveness to changes.

2. Introverts will be attracted to fields and specialties requiring sustained attention, more time in solitary work or one-to-one interactions.

3. Introverts will be found in greater numbers in fields requiring graduate and postgraduate training, and in academic settings.

b) SN Predictions:

1. Sensing types, who have a special interest in the immediate, practical details of events, will be especially attracted to fields requiring care and precision, consistency in following established practices, and skill in action rather than skill in work and symbols.

2. To the extent that patient care is concerned with practical attention to day-to-day events and use of well-learned knowledge, sensing types will be attracted to direct patient care.

3. Sensing types, who are more oriented to the present experience, more conservative, and often more fun-loving, will be attracted to smaller communities and to areas where they can find their own preferred kinds of recreation.

4. Sensing types will average lower than intuitive types on written aptitude or competence measures, but will equal intuitive types when tested by actual performance.

5. Intuitive types, with their interest in finding patterns in complex systems and in using creativity and imagination to see new possibilities, will be especially attracted to fields on the cutting edge of developments, and to activities with diagnostic or treatment challenges.

6. Intuitive types will average higher scores on any measures of aptitude or competence using written tests, or requiring communication at an abstract or symbolic level.

c) TF Predictions:

1. Thinking types will be attracted to activities requiring technical skill with equipment, (especially ST types), knowledge of the physical sciences (especially NT types), and to those aspects of patient care where tough minded objectivity is an advantage.

2. Feeling types will be attracted to occupations where the human component is important, and will be most attracted to activities which require directly caring for people(especially SF types), and understanding people (especially NF types).

3. Feeling types will need less training in communication skills than thinking types, with E-F types easiest of all to teach.

d) JP Predictions:

1. Judging types will be attracted to occupations and settings where schedules, system, and order are important (especially S-J types).

2. Judging types will more often be classified as "over-achievers" and will average slightly higher grades than would be predicted from their aptitude scores.

3. Judging types will be seen as more dependable, responsible, than perceptive types, but less open to new information and less adaptable than perceptive types.

4. Perceptive types will be attracted to situations requiring constant adaptability to changing demands.

5. Perceptive types(especially the intuitives) will have the greatest interest of all types in independent study or independently following their own interests and hunches.

6. Perceptive types will have somewhat higher aptitude scores than judging types, but will earn somewhat lower achievement scores than predicted from their aptitudes.

7. Perceptive types will be rated higher in openness to new information, flexibility, and adaptability, but lower in responsibility and dependability than judging types.

e) Combination of Preferences

Predictions made by McCaulley (1983) for specific combinations of preferences include:

ST: Practical and matter-of-fact. Like to give patient care by applying technical skills to daily tasks, by expert use of tools and equipment.

SF: Sympathetic and friendly. Like to give patient care through daily tasks aimed at nurturance and comfort.

NF: Enthusiastic and insightful, with good communication skills (especially ENF types), and likes to give patient care through psychological understanding.

NT: Logical and ingenious, as well as the most scientific (especially INT types) of the types; likes to give patient care through application of science and programmatic planning.

SJ: Organized, dependable, conservative, tolerant of routine.

NP: Independent, spontaneous, demanding of constant challenge.

IN: Thoughtful, innovative, scholarly, and interested in teaching and research.

EN: Active, innovative, interested in bringing new possibilities into being.

IS: Practical and thoughtful, interested in realistically conceptualizing events, and good at sustained observations (especially IS-P types).

ES: Skillful in action, interested in implementation and practical accomplishments.

Monograph II described the results of a longitudinal study of 5355 medical students tested in the 1950's while the MBTI was under development and which were twice followed up to see if they had chosen specialties consistent with theoretical predictions for their type. The CAPT Bibliography for the MBTI is a computerized listing of primarily research publications using the MBTI as the data-gathering instrument relative to the application of Type theory to a wide variety of endeavors. These works put Jung's theory to practical use in the health care professions, to improve the selection of students who have developed type maturity and to train them so "that they raise their gifts to high levels of excellence, and also learn well the necessary skills that come less

easily to their type," offered Dr. Mary H. McCaulley, CAPT CEO (personal communication, 1996).

The Trait-Factor Theory and Personality Characteristics in Medical Students

Interest has also developed in determining the personal characteristics of applicants to medical school and the predictive effects that these characteristics might have on performance in medical school. Hobfoll and Benor (1981) examined an admissions interview format that tended to stress personal characteristics over academic measures. They reported that interview ratings tended to be positively related to clinical performance, although the relationship was not statistically significant. Powis, Neane, Bristow, & Murphy (1988), found that interviews geared toward measuring personal qualities could identify students who would not complete medical school.

Elam & Johnson (1992), in a more recent work, examined the predictive value of admission interview ratings on performance in medical school while controlling for candidates' preadmission academic performances. They also investigated whether characteristics of interviewers were related to their abilities to predict applicants' subsequent academic performances in medical school. They found that admission interview ratings were not correlated with the USMLE examination scores, but that the predictive value of interview ratings generally increased over time in medical school. The interview ratings assigned by women interviewers were more highly correlated with medical students' performances than were the ratings of men interviewers. The authors concluded that particular interviewers might be better able to notice personal characteristics indicative of the ability to succeed in the classroom while other

interviewers may be better able to evaluate factors that contribute to success in the clinical setting. The list of factors included maturity, motivation, rapport, empathy, integrity, personal manner and communication ability, extroversion, and independence.

Daugherty, Nora, Schmidt and Goodman (1992) have also recently identified the characteristics of medical students who were poor preclinical performers but went on to do well in clerkships. As a group, these students were less likely to speak English as a second language and more likely to be women. This group had a more difficult time with standardized examinations and appeared to be handicapped by an emphasis on this mode of evaluation. The authors stated that "women seemed to score less well on examinations that required the memorization of facts as opposed to the learning of concepts" (p. S85). Evaluations that took place in the more integrative setting of clinical education alleviated this disadvantage and the women students showed marked improvements simply because the manner of evaluation shifted to a style more closely approximating the way women learn.

Also, when comparing the scores of 521 first-year medical students on the MBTI with their specialty choice, Friedman and Slatt (1988) found that the MBTI was statistically predictive of specialty choice in the first postgraduate year. Finally, Leiden, Veach, and Herring (1986) examined the scores of 81 medical students on the original and the abbreviated versions of the MBTI, which were administered 18-21 months apart. They found that agreement and correlation coefficient were high, while the Thinking-Feeling scale appeared to be the least stable.

Quenk (1975) together with Heffron (Quenk & Heffron, 1975) compared 91 family practice teachers and 85 residents, and found that the combined group was different from the general medical population, tending to be practical, realistic, present-oriented, organized, and able to deal effectively with factual information. The majority were persons who enjoy seeing immediate results of actions and who can make decisions quickly and effectively using whatever information is available. These personality types are similar to those found in the older field of general practice. The residents and faculty were similar in the above respects but a higher percentage of the residents tended to make judgments using impersonal logic as an actual basis for reaching decisions. The faculty, however, had a significantly higher percentage of types who make judgments by considering human values and understanding of people.

Interest in personality profiles and the relationship between a student's personality and his/her chosen medical specialty can be traced to the 1930's as exemplified in Fishbein's (1930) "Doctors and Specialists". Numerous articles were written during the 1950's and 1960's attempting to show that specialty choices were linked to the physicians' personality traits or other characteristics, such as political views. Schumacher published work in 1963 that found psychiatrists to be the most psychologically distinct group of physicians relative to other physicians. In 1967, Kritzer and Zimet described surgeons as having distinct differences relative to other physicians.

More recently, Zeldow and Daugherty revisited the issue of the influence of personality variables on specialty choices. They studied the relationship between the personality types of the members of two graduating classes of medical students and their

specialty choices, finding that the personality profiles for surgeons supported reports from earlier literature. The profiles for obstetricians, psychiatrists, and pediatricians were "complex and provocative". They could find no distinctive personality profiles for internists or family practitioners (1991, p.185).

In 1992, Daugherty, Nora, Schmidt and Goodman concluded that, "we encourage other researchers to pay more attention to the exceptions as well as the 'rules' when outlining general predictive trends. Advances in our understanding of how best to train physicians will come from understanding different types of medical students and their different pathways through the process. While it is easier to think in terms of good students and bad students overall, the reality is that most students fall somewhere in between. Understanding what makes some students bloom in the clinical years will help us tailor both our educational programs and our tools for evaluation (1992 p. S85)."

Concepts of Success or Failure in Personality Theories Related to Academia

Glasser (1972) sees the acquisition of a positive and successful personal identity as the most important occurrence in the growth of an individual. To the medical student, the passing of the numerous exams, including the United States Medical Licensing Examination, Step 1, is a significant part of that sense of success. Yet, a number of students who take the exam at the end of their second year of coursework fail. "Identity has to do with the way one sees oneself as a human being in relation to others. Personality identity, then, precedes performance; acceptance as a person comes before achievement of a goal or task" (Gilliland, James,& Bowman, 1994, p. 297). An individual can either have a success or failure identity, and the failure identity can prevent

the student from succeeding: "A failure identity is but one variable that might interfere with the development of a success identity" (Gilliland, James, & Bowman, 1994, p. 312).

Although Freud and others felt that the failure identity and fear of success may be rooted in both oedipal and preoedipal conflicts, and that work (school) inhibitions may arise from repressed aggression displaced onto occupational tasks (e.g. studying for educational demands), Glasser and others thought that the need for a success identity is a basic social force (Glasser & Zunin, 1979; Wasylenki, 1984). Glasser and Zunin (1979, p. 314) state that, "a person's identity defines him(or her) in relation to others. This need for involvement is an integral part of the organism and is the primary driving force governing all behavior." Also, in Western civilization, "survival society" has been replaced by "identity society".

The development of a psychologically healthy personality involves a struggle to find one's self as a human being. In the survival society, personal identity was tied almost exclusively to the individual's goals, aspirations, or task performance; in the identity society, identity relates more to one's search for acceptance as a person than as a performer of a task. (Glasser, 1972, p. 10)

Glasser identified four psychological needs: (1) need for friends, family, love; (2) need for power (self-esteem, recognition, success, and competition); (3) need for fun (play, laughter, learning, and recreation), and (4) need for freedom to make choices. A sense of failure and loss of control results if one need dominates. Equal weighting creates health (Glasser, 1984).

According to reality therapy, failure is not seen as a personal defect but as a distinct component of behavior that has not been planned carefully enough to allow the behavior and, subsequently, the person to succeed (Gilliland, James, & Bowman, 1994). Focusing upon elements, which may have affected the failure, rather than punishing or labeling the student as a failure, will thus enable the student to concentrate on developing a success identity, which includes aspects of his or her personality. The student then focuses appropriately on increasing control over his or her environment by evaluating their own behavior and choosing more effective and productive behaviors.

Thus, responsibility is achieved when students are able to fulfill their needs competently and autonomously without depriving others of the means to satisfy their own needs. In the process, the student's inherent limitations are not ignored, but neither are limitations allowed to be used as excuses for personal attributes and potentialities. The student can develop strategies to identify and meet the demands, while not being penalized for failure. Students who cannot or will not deal with consequences of their actions, engage in negatively addicting behaviors, or otherwise have a failure identity can be given easily understood and implemented methods and techniques for changing their behavior. For many such failure-identity individuals, this approach may be a strange new way of thinking and behaving and may be in direct contradiction to the punitive and repressive atmosphere in which they have existed. When they discover they are not condemned for their past problems, are provided with understanding for failures, supported for renewed efforts, and given positive reinforcement for success, they are

capable of remarkable achievements through adherence to reality therapy principles (Gilliland, James,& Bowman, 1994).

Reality theorists are not the only ones interested in studying the issue of success or failure. Although Adlerians are reticent to classify people, they do propose types, none of which are inherently bad (Mosak & Dreikurs, 1973). However, the behavioral outcome of each will depend upon what the individual does with his or her convictions or fictional goals (Vaihener, 1956). One's lifestyle influences one's feelings, thinking, and behaving (Rule, 1985).

It matters not so much what the individual is born with or into but rather how the individual perceives his or her genetic and environmental endowment and what he/she does with it. Constitutional traits are not considered to be causative, and behavior is a function of perception. We tend to behave according to how things appear to us, and when our perception changes, our behavior changes accordingly. (Dinkmeyer, D.C., Dinkmeyer, D.C. Jr., and Sperry, L., 1987, p.18; see also Dinkmeyer, 1975)

If the fictional goals become dysfunctional, they can lead to neurosis, psychosis, substance abuse, etc., and eventually failure (Ansbacher & Ansbacher, 1956). Therefore, Adlerian therapy is aimed at increasing the individual's self-esteem and developing his social interest by helping her/him discover her/his own lifestyle and avoid the mistaken assumptions which cause feelings of inadequacy. Helping the student anticipate success also is emphasized.

From the perspective of cognitive behavior theorists, maladaptive cognitions are also seen to be some of the many factors involved in the success or failure of the student.

According to Mahoney (1974), failure may be due to several cognitive deficits: (1) selective inattention - ignoring relevant stimuli and attending to irrelevant stimuli; (2) misperception - mislabeling certain stimuli, both internal and external; (3) maladaptive focusing - focusing on irrelevant external events or stimuli; (4) maladaptive self-arousal - focusing on irrelevant internal cues, and (5) repertory deficiencies - limited or maladjustive behavior caused by deficiencies in cognitive (covert) and/or behavioral (overt) skills.

Cognitive behavior therapy, cognitive therapy, and cognitive behavior modification can, following assessment, be beneficial and are based on the assumptions that (1) maladaptive cognitions lead to maladaptive, self-defeating behaviors; (2) adaptive, self-enhancing behaviors can be induced through the student's learning to generate positive, self-enhancing thoughts; and (3) students can be taught to shift from covert, self-defeating thoughts and attitudes to self-enhancing thoughts, attitudes, and behaviors.

Success or failure has also often been linked to the need for achievement. Murray's (1938) taxonomy of human motivation included the need for achievement or the desire to accomplish something difficult, and research has shown that the need for achievement is often positively related to success in school, especially in coursework related to the chosen career, and to the ability to delay gratification to obtain later greater rewards (Benner, 1985). The high need for achievement has also been associated with high-status occupations and successful business people.

Atkinson (1964) proposed that in every situation there is both the need to achieve success and the need to avoid failure. The person's behavior is determined by the relative strength of each motive and the expectancy and incentive value of success and failure. Individuals with a high need for achievement take personal responsibility for success and attribute failure to insufficient effort. On the other hand, individuals with a low need attribute success to external factors, and failure to a personal lack of ability (Benner, 1985).

Psychologists have primarily viewed the need for achievement as a learned motive, supported by parents' shaping later goals and setting standards for their children's success. It has also been noted that achievement tests are often used as criterion for further education and measures of success. Achievement tests, such as the USMLE Step 1, measure proficiency in a specific area by testing performance or knowledge in that area, including measuring the effect of training and evaluating past performance. Positive feedback can encourage the student, while some critics assert that discouraging results may have a detrimental effect on future performance, influencing the sense of a failure identity on the part of the student. Also, individuals who have educational deficits not of their making suffer discrimination, which can result in a sense of failure. This can be minimized by utilizing criterion-referenced achievement tests rather than norm-referenced tests (Gorth, O'Reilly, & Pinsky, 1975).

A number of variables have been linked to success in the academic world, including teacher expectations (Kenealy, Frude & Shaw, 1991); biodata (Melamed, 1992); leadership, self-confidence, and family support (Pintrich, 1989; Tracey &

Sedlacek, 1984); achievement motivation (Murray, 1938); knowledge, motivation, approaches to study, and general intellectual ability (Horn, Bruning, Schraw, Curry, & Kathkanant, 1993). Snow and Lohman (1984) found that learners who possess high ability, high domain knowledge, or both, tend to have highly individualized methods of study. Emerick (1992), when studying academic underachievement among gifted students and the factors influencing a possible reversal of underachievement in gifted students, found six factors: out-of-school interests; parents; goals associated with academic achievement; classroom instruction and curriculum; the instructor, and changes in self.

Rothstein, Paunonen, Rush, and King (1994) used a sample of 450 Master of Business Administration students in London, Ontario, to study personality and cognitive ability variables regarding predictability of class and written performance. They found that verbal and quantitative aptitudes of the students were strong predictors of performance at written work, but were even more predictive of class performance. The "Big Five" factors of personality (Extroversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience) did not predict either classroom or written performance consistently. Instead, they found that personality variables relate to academic success when characteristic modes of behavior play a role in academic performance.

Previous Research on Success/Failure in Medical Students

Markert (1984) used discriminant analysis to identify the noncognitive characteristics of high-achieving medical students, and to differentiate high-GPA medical

students from low-GPA medical students on noncognitive characteristics (Rotter's Internal-External Locus of Control Scale, the Adjective Check List, and the Student Orientations Survey). Results indicated that students with high preclinical GPAs tended to be less autonomous and assertive and more external in locus of control than students with low preclinical GPAs. Differences in noncognitive characteristics were not found between students with high clinical GPAs and their counterparts with low clinical GPAs.

Murden, Galloway, Reid, and Colwill (1978), examined academic and personal predictors of clinical success in medical school. They found that students judged by admissions interviewers to have high levels of maturity, nonacademic achievement, motivation, or rapport were approximately 2-3 times more likely to receive outstanding internship recommendations as those without such personal characteristics. Undergraduate GPA had a smaller but significant relationship with clinical success as measured by internship letters. This suggests that additional emphasis during selection upon applicants' personal characteristics would have enhanced the clinical success of these students.

The importance of noncognitive characteristics derived from admission interviews was pertinent to gender research by Calkins, Arnold and Willoughby (1987), in a study involving 288 medical school graduates of a 6-year BS/MD program at the University of Missouri, Kansas City. Cognitive characteristics (baccalaureate coursework, clinical clerkships, licensing exam scores and 1st year residency evaluations) were more predictive for the 180 male subjects, while the noncognitive qualities revealed in references and admission interviews, previous health care work experience and parents'

educational level were better predictors for academic success for the 108 female medical graduates. This research affirmed the prior work by Willoughby, Calkins and Arnold (1979), Arnold, Willoughby, Calkins and Jenkins (1981) and Calkins, Willoughby and Arnold (1982). Of interest is Harward, Lyons, Porter and Hunter's 1981 culmination of a 4-year study at the University of North Carolina, which found no differences in academic performance for female and male medical students.

The cognitive variables of aptitude testing and high school science/mathematics preparation have been found to be significant predictors of GPA, Quarterly Profile Examination, and Clinical Performance Examination scores during the first two years of a BA/MD program (Calkins, Willoughby, & Arnold, 1982). Data included for 51 minority (Blacks, Native Americans and Hispanic Americans) and 396 nonminority students support the position that separate equations are not necessary to predict performance of minority and nonminority students. Admission committees, when selecting minority students, should recognize both personal attributes and academic preparation as indicators of potential success or failure.

Kerbeshian (1989) found that some Native American students who had withdrawn from medical school were slightly younger, had more siblings, and had attended reservation schools. Problems noted by students also included poor academic preparation, excessive family responsibilities, and cultural misperceptions. There also was a significant difference between the scores of the Native American students and the scores of a random sample of majority students matched by class and sex on traditional admissions criteria.

Previous Research on Success or Failure for Medical Students on the United States Medical Licensing Exam Step 1 (USMLE Step 1)

Success or failure is of utmost importance to the medical student or resident's sense of self even though the USMLE exams themselves do not yield an exact duplication of his or her clinical skills or performance (Verhulst, Colliver, Paiva, & Williams, 1986). The USMLE Step 1 exam also influences the costs of medical education and eventually the cost of health care itself. Therefore, counseling psychologists, with their background in testing, education, and vocational psychology, can assist both the student and the institution by predicting success on the exam (Frierson, 1984). One method of accomplishing this is to study the personality factors, which may differentiate between those who are successful and those who fail on the exam (Hendron, 1988).

When using locus of control on Rotter's (1966) Internal-External Locus of Control Scale to predict the USMLE Step 1 scores of failed and at-risk students, a significant difference appeared. A strong internal locus was correlated with successful students and an external locus was noted in those who failed (Peters & Schimpfhauser, 1992). In addition, additional research revealed that students who had failed the USMLE Step 1 had poor proportional reasoning, correlational thinking, hypothetical-deductive thinking skills, or chronic anxiety (Blanc & Martin, 1984; Frierson,1984; Frierson & Hoban, 1992).

Blanc and Martin (1984) evaluated eighteen medical students who had failed Step 1 of the USMLE tests, once or repeatedly, for reasoning skills and other diagnostic

variables prior to participating in a basic science instruction program. Results showed that most of the students had poor proportional reasoning, correlational thinking, or hypothetical deductive thinking skills. Based on test-retest gains and on their rate of persistence in the 2-month program, it was concluded that the program was beneficial for the students with multiple failures, particularly in its focus on developing reasoning skills.

Previous Research Associating the API with Success/Failure

Although the API has been used extensively in business and industry, very little published research on the API exists (Gilliland, 1991). Krug and Ahadi (1990) examined the personality characteristics of wives and husbands participating in marriage enrichment, and found that the API appeared to be a sensitive indicator of relevant areas of interpersonal conflict. Gilliland, in 1991, studied the personality traits of effective versus non-effective music teachers (N = 109), and significance was found on the "independent", "creative", "enterprising", "aesthetic", "extroverted", "withdrawn", "submissive", "sociable", "assertive" and "practical" scales (Gilliland, 1991). Both sexes scored below the norm on the "adjusted" scale, but females were significantly more well adjusted than were the males. Females, also, scored significantly higher on the "tough-minded" and "enterprising" scales, while men were more "withdrawn", less "assertive", and less "practical" than the women were (Gilliland, 1991). Both men and women scored far below the mean on the "bad impression" validity scale, with women scoring significantly lower then men. Gilliland thought, based upon this research, that the API

"was effective in determining personality characteristics that existed in some measure in the music teacher study population" (p. 118).

Despite the fact that little published research exists, because the API retains precise links with the 16PF and the underlying personality model on which the 16PF is based and a joint factor analysis of the two instruments show that they were structurally identical, the API can draw from the research involving the 16PF (Krug, 1984, 1991). When Eison, Pollio, and Milton (1986) studied the personal and educational characteristics of learning-oriented and grade-oriented students, using the Sixteen Personality Factor Questionnaire (16PF) and the Myers-Briggs Type Indicator, differences were found. The high learning-low grade-oriented subjects were characterized by sensitivity, self-motivation, abstract reasoning, low tension, high level of responsibility and good study methods. The low learning-high grade-oriented subjects displayed conventionality, a realistic approach, high tension or anxiety, low level of internal locus of control and poor study habits. High learning and grade-oriented subjects combined concrete thinking with realism, extroversion, and high test anxiety. Low learning and grade-oriented individuals had the highest levels of frustration and lowest levels of extroversion, as well as average test anxiety and test skills.

Previous Research Associating the MBTI with Success/Failure

Students (N = 319) enrolled in associate degree programs at a small college were measured by Ferrari and associates (Ferrari, Parker, & Ware, 1992) regarding academic procrastination, and the personality variables of MBTI types, self-efficacy, and academic loss of control. Results indicated that procrastination was not significantly related to

either MBTI type or locus of control, but was negatively correlated with general self-efficacy. They also concluded that academically disadvantaged college students tend to engage in frequent procrastination behavior when the student believes he or she is ineffective at mastering general life events. Millott and Cranney (1976) administered the MBTI to 2,514 college freshman and found significant correlations ($p < .001$) between paragraph comprehension and preference for MBTI personality types of Intuition, Introversion, and Perception.

Possible explanations for performance on the USMLE Step 1, based on personality type, were studied by O'Donnell (1982), using the MBTI. Medical students ($N = 114$) completed the Myers-Briggs Type Indicator (MBTI) along with other attitudinal and cognitive measures. The students were grouped into four MBTI types and classified as to whether they had passed or failed Step 1 of the USMLE in their first attempt. Results showed that those belonging to the intuitive-feeling group had more difficulty than any other personality-type group in passing the exam the first time.

In a study conducted with 67 family practice residents in training, after completing the Millon Clinical Multiaxial Inventory, the Maslach Burnout Inventory, and Myers-Briggs Type Indicator, numerous relationships were found among personality measures, burnout scores, and measures of regret (Lemkau, Purdy, Rafferty, & Rudisill, 1988). Personality factors were more predictive than demographic or situational variables of the variability in burnout among the residents, including reduced social contact and compulsive personality characteristics. Quenk and Heffron (1975), conducted a study of personality types of 91 family practice teachers and 85 residents,

using the Myers-Briggs Type Indicator. Results indicated that the combined group tended to be practical, realistic, present-oriented, organized, and able to deal effectively with factual information. They also enjoyed seeing immediate results of actions, made decisions quickly and effectively. The personality types were similar to those found in the older field of general practice, but different from the current general physician population. In addition, the residents were more likely to make judgments using impersonal logic and a factual basis for making decisions, whereas the faculty were more likely to make judgments based upon consideration of human values and understanding of people (Quenk & Heffron, 1975).

Summary

In summary, with the rising interest in managed health care and attendant costs reduction, counseling psychologists can make significant contributions in the field of educating and training of physicians. The medical student's success or failure in medical school and on the United States Medical Licensing Examinations (USMLE) influences the cost effectiveness of his or her medical education and eventually impacts the public's cost for health care.

Counseling psychologists can assist both the medical student and the institution by promoting successful passage or by targeting students at risk to fail the USMLE Step 1. One such method is to study the personality factors, which may differentiate between those who were successful and those who failed the exam. The current study thus proposed to examine personality characteristic, as measured by the Myers-Briggs Type Indicator and the Adult Personality Inventory, for any relatedness to success or failure on

Step 1 of the crucial USMLE. Pre-exam identification of targeted at risk students permits board preparation exam review, for instance, which promotes a preventive approach rather than seeking remediation or a cure.

CHAPTER II

METHOD

Statement of the Problem

Becoming a medical doctor is a daunting task. Fledgling physicians strive to remain on the normal pathway to completion, as any deviation can create a derailment. An important part of this pathway includes successfully passing the United States Medical Licensing Examination Steps 1,2,3 (USMLE Steps 1,2,3), which is now required for all medical students or graduates from medical schools accredited by the Liaison Committee on Medical Education wishing to secure their first license to practice in the United States of America (FSMB & NBME,2002).

Since many medical schools require students to pass USMLE Step 1 before permitting their entry into clinical rotations, a failure results in additional expenditures of critical resources for both the medical student and the institution:

1) psychological - the student often experiences a drop in self-esteem, questioning the appropriateness of his/her professional career choice and the ability to succeed there; likewise, the medical school's faculty and staff incorporate the student's failure into their own self-images of competency to educate;

2) financial - due to the schedule of coursework, when medical schools require passage of the USMLE Step 1 prior to being assigned clinical duties, often a student who has failed will have to wait a minimum of 6 months to rejoin his/her class, if the program

so allows. Otherwise, the student may be forced to wait until the following year's class begins clinical rotations. Additional monies are obviously required to support the student's basic needs in the interim. In some instances, failure means the loss of scholarships, grants or other external supports. If a remedial program is selected, that tuition plus temporary relocation expense to a remedial program site can create real financial hardship.

Ultimately, that larger price tag is billed to the health care consumer. This strongly impacts our national concern for harnessing the seemingly runaway rise in costs for health care services.

3) academic - interruption in the student's program of study interferes with student to professor ratios for the current class and subsequent class placement, besides the difficulty of re-entering the study program at the appropriate point.

Any of these three problem areas may eventually result in the student's discontinuing his/her medical education. That means the loss of a major health service provider - the physician - along with any private/state/federal moneys already disbursed.

Development of the Hypotheses

Considering the significant costs, it seemed reasonable to ask whether it is possible to tease out some variables associated with success or failure to enable a proactive preparation, rather than relying only on remediation? From this question, the following hypotheses emerged:

Hypothesis #1. Success/Failure on the USMLE Step 1 is related to Ethnicity/Race.

Hypothesis #2. Success/Failure on the USMLE Step 1 is related to Gender.

Hypothesis #3. Success/Failure on the USMLE Step 1 is related to results from the Adult Personality Inventory, (API), a quantitative instrument.

Hypothesis #4. Success/Failure on the USMLE Step 1 is related to results from the Myers-Briggs Type Indicator, (MBTI), an instrument, that yields both quantitative and/or categorical results, with the categorical results being utilized for this research.

Hypothesis #5. Success/Failure on the USMLE Step 1 is related to a combination of Gender, Race/Ethnicity, MBTI and API results found in their prior respective analyses against the success/failure poles.

The operative assumption throughout the assembly of the literature review, development of the hypotheses and the preparation, implementation and resolution of this study was that characteristics distinguishing successful from failed medical licensing examinees could be identified and measured.

It then became the intent of this research to examine medical students' psychological variables as well as demographic data, trying to identify any factors that may differentiate successful medical students from those who fail the USMLE Step 1.

Participants

Securing an adequate number of subjects to effect a robust study disappeared as a concern when both universities granted access to their archived databanks from their respective ongoing testing and data-gathering efforts. The time span from 1992-1994 was chosen, providing 486 subjects in number, with 377 subjects enrolled in the University of Kansas School of Medicine, under Dean Daniel Hollander, M.D. and 109 subjects enrolled in the University of Missouri, Kansas City, Institute for Professional

Preparation with Dr. Robert Blanc as the CEO (now retired) and Mr. Martin Jolley, the current CEO. Although additional medical students from WHO medical schools outside the United States had been tested and entered into the UMKC,IPP databank, for the purposes of standardization of instruction and training, only medical students formally enrolled in medical schools in the United States were included in this study.

Data within sample population that was applicable for Hypothesis 1 for Ethnicity/Race yielded a total n=486. KUSM had 29 Asians, 9 Blacks, 321 Caucasians/ Whites(C/Whites), 11 Hispanics and 7 Native Americans. UMKC,IPP provided 8 Asians, 43 Blacks, 50 C/Whites, 2 Hispanics and 6 Native Americans. The totals were: 37 Asians, 52 Blacks, 371 C/Whites, 13 Hispanics and 13 Native Americans.

Likewise, data on Hypothesis 2 for Gender yielded a total n=486. KUSM had 125 Females and 252 Males. UMKC,IPP had 59 Females and 50 Males. The totals were: 184 Females and 302 Males.

Data on Hypothesis 3 for the Adult Personality Inventory (API) yielded a total n=179. 127 medical students from KUSM and 52 medical students from UMKC,IPP participated.

Data on Hypothesis 4 for the Myers-Briggs Type Indicator yielded an n=209. 149 were KUSM medical students and 60 were medical students enrolled at UMKC,IPP.

Data on Hypothesis 5 for both the API and the MBTI plus demographics yielded an n=171, with 121 KUMC students and 50 students at UMKC,IPP writing both psychometric instruments.

Instruments

Definition of Terms

The United States Medical Licensing Examination Steps 1,2,3 (USMLE Steps 1,2,3) information occasionally still generates confusion because this examination has began replacing the National Board of Medical Examiners, Parts I, II, III (NBME, I, II, III) in 1992, with full phasing-out accomplished in 2000. The USMLE is governed by the Composite Committee consisting of representatives from the FSMB, NBME, Education Commission for Foreign Medical Graduates (ECFMG) and from the American public, all appointed by the parenting FSMB and NBME. Results from the USMLE exams are provided to individual states and jurisdictions of the United States to assist them in granting the initial license to practice medicine. Currently, the USMLE is computer administered and scored at Prometric Test Centers worldwide for Steps 1 and 2, but sites are restricted to the United States and its territories for Step 3.

Eligibility rules for Steps 1 and 2 require applicants to be medical students or graduates of allopathic medical schools in the U.S., Puerto Rico or Canada that are accredited by the Liaison Committee of Medical Education (LCME). It is offered as an option to like applicants from American Osteopathic Association accredited sites in the U.S. These applicants register with the NBME. The USMLE Steps 1 and 2 are also available to foreign-based medical school students and graduates who are eligible through ECFMG certification, where they register. Applicants for Step 3 of the USMLE must meet the requirements of the medical licensing authority to which they are applying, must have a Medical Doctor or Doctor of Osteopathy (osteopathic medicine) and must have

passed Steps 1 and 2. Additionally, a graduate of a medical school outside the U.S., Puerto Rico or Canada must have ECFMG certification or complete a "Fifth Pathway" program. All Step 3 applicants register with the FSMB (FSMB & NBME, 2001).

The USMLE is divided into three main parts. Step 1 measures accrued knowledge from classroom materials and information. Step 2 measures the student's ability to conceptualize the wellness or illness of the client after the student has completed the 2-year clinical experiential rotation among the general medical and surgical care and specialty areas. Step 3 measures competency in general medicine after Year 1 at residency status. (Berner, Brooks, & Erdmann, 1993; Hoffman, 1993; Obenshain, 1993; O'Donnell, Obenshain & Erdmann 1993; Williams, 1993).

The USMLE steps are sequential in the sense that the examinee must pass one before being allowed to sit for the next in number. Once the USMLE Step 1 has been successfully negotiated, the testee has seven years to complete the Steps 1 and 2. The examinee is granted unlimited retakes, but after six failures must demonstrate additional education before more attempts will be allowed (FSMB & NBME, 2002).

Other examinations for medical licensure are the Special Purpose Exam (SPEX) for the Post Licensure Assessment System (PLAS) for issues of reciprocity or disciplinary assessment and the Comprehensive Osteopathic Medical Licensing Examination (COMLEX-USA). Additionally, licensure may be granted by the FSMB to applicants who tested out in parts of the NBME prior to its complete phasing out in 2000 in favor of the USMLE (NBME, 2000).

In this research study, the terms "Success" or "Pass" indicate a successful passage of the USMLE Step 1 on the first attempt.

The terms "Fail" or "Failure" refer to an unsuccessful first attempt to pass the USMLE Step 1.

Demographics

Demographics included Ethnic/Racial heritage and Gender.

Ethnicity/Racial heritage was divided into the categories of Asian, Black, Caucasian/White, Hispanic and Native American. These terms were selected by this author as being the best descriptors of the sample population's Ethnic/Racial categories. Since the subjects were all students at U.S. medical schools, but were not all U.S. citizens, labels such as "African American" or "Asian American" were not utilized.

Gender subgroups were Females and Males.

Since it was also an intent of this research to utilize standardized tests, it was a welcome discovery to find an overlap between the two institutions on two psychometric instruments, the Adult Personality Inventory (API) and the Myers-Briggs Type Indicator (MBTI).

Adult Personality Inventory (API)

The Adult Personality Inventory is a psychological test created by Samuel Krug, Ph.D. for determining and defining 21 personality traits that form the foundation for his widely researched, extensively validated and well-documented theory of behavior (Krug, 1984). Revised in 1992, the inventory consists of three main areas; Personal Characteristics, Interpersonal Style, and Career/Life-Style Factors.

The Personal Characteristics segment is useful in individual counseling situations to increase understanding of major personality dimensions and the underlying dynamics, with these traits being Extroverted, Adjusted, Tough-Minded, Independent, Disciplined, Creative and Enterprising.

The Interpersonal Style scales simplify the mechanisms of the client's relating to others and includes Caring, Adapting, Withdrawn, Submissive, Uncaring, Nonconforming, Sociable and Assertive.

The Career/Life-Style scale selects occupational roles that would provide the best fit and, thus, the greatest opportunity for success. These traits include: Practical, Scientific, Aesthetic, Social, Competitive and Structured.

For reporting purposes, the API includes 4 validity scales, the Good Impression, Bad Impression, Infrequency and Uncertainty. These validity scales, which are not a part of the "Individual Assessment Report" provided to the test subject, yield information that might render questionable any conclusions made from the test results.

The Good Impression Scale was developed by identifying socially desirable alternatives and including them without regard to their relationship to personality. In fact, they are not scored on any other scale on the API. It is presumed that a person answering "generally true" to the Good Impression items is displaying a tendency to present him/herself in a good light.

The Bad Impression scale was devised to determine those individuals who complete the questionnaire under normal instructions and whose scores indicate a desire to "fake bad." These items are scored only on this scale and have no relationship to the

other personality scales. Persons scoring above average on the Bad Impression items may be attempting to manipulate deliberately the test data to affect the test profile, or high scores may indicate that a psychological problem is present. Another validity scale incorporated into the API is Infrequency of response. This scale was developed by identifying items that were seldom selected by individuals who took the tests leading up to the production of the API. Under normal circumstances, individuals with an above average score on this scale have most likely been careless in selecting their test responses. Another explanation is that the individual is suffering with some sort of psychological problem (Bolton, 1985).

The last validity scale present in the API deals with Uncertainty. The Uncertainty score reports the number of middle responses ("uncertain") selected by the individual and it is not included in any other personality characteristic scales. Above-average scores from these "middle" responses may indicate defensiveness, confusion, or random responding. The scoring distribution on the Adult Personality Inventory is represented by 21 Report scales, measuring seven personality characteristics, eight interpersonal styles, and six career/lifestyle factors, plus four validity scales. The scores for all range from a possible "0" to a possible "100. Chart scores are in three ranges: scores from 1-4 are deemed "low," 4-7 are "average," and 7-10 are "high. "The interpretation is that the lower numbers suggest less connection to that particular trait and the higher numbers are affiliated with strength for that characteristic (Krug, 1984).

The Adult Personality Inventory is an objective pencil and paper instrument containing 324 scaled items. The long version requires approximately one hour to

complete for the average examinee with over 4th grade reading skills. It is built for use with individuals who are 16 years or older (Krug, 1996).

The Myers-Briggs Type Indicator (MBTI)

The Myers-Briggs Type Indicator is a psychological instrument developed by Briggs and Briggs Myers (1962) and revised by Myers and McCaulley (1985). The original (and current) impetus was an attempt to capture Jungian typology in a psychometric instrument that yields four polarity scores: extroversion vs. introversion (E/I), sensation vs. intuition (S/N), thinking vs. feeling (T/F), and judgment vs. perception (J/P). The separate scoring of each pair assumes that there is a "true dichotomy" (one must lean either one direction or the other) between the two components. In addition to a graphic rendition of the personality characteristics, a narrative report is generated which describes the individual in concrete terms and defines the manner in which one could be expected to behave in given circumstances (Devito 1985, p. 1032).

The manual outlines ways of giving interpretations and suggests applications of the instrument in education, counseling, career guidance and other situations.

The MBTI is an objective pencil and paper instrument. Form F has 166 items including research items. Either a computer generated scoring or hand scoring is done from the same response sheet. The MBTI is an appropriate assessment tool for grades 9-12 and adults, with clear instructions. There is no time limit, although an hour is regarded as ample time. It may be read aloud to sight-challenged clients, with the proviso

that the examiner deliberately sound open-ended and unbiased (Myers and McCaulley, 1985).

According to Devito (1985), the MBTI is probably the most widely used instrument for non-psychiatric (normal) populations in the areas of clinical, counseling and personality testing. While the items were written within a forced-choice format, the MBTI is not so aversive as other forced-choice instruments (e.g., the Edwards Personal Preference Schedule). This is because any single question deals with only one polarity (e.g., T/F). The responses within an item generally reflect two opposing, rather than competing, choices. This feature also permits normative rather than ipsative scoring.

Reliability of the MBTI is presented from two perspectives in the manual. For the adherents to type theory, the greater interest is in seeing that type remains the same upon readministration of the instrument. For those with a more traditional psychometric orientation, the stability of the continuous scores is of interest as personality measures, SAT performance, selected Strong Vocational Interest Blank scales, and the Edwards Personal Preference Schedule.

rationale here is that the Thinking, Feeling, Sensing and Intuiting functions manifest themselves in academic and career choices (Devito, 1985).

Quantitative results are derived from examining the differential in scoring for each dichotomy tested. The ranges are: E53...0...I59; S67...0...N51; (Males) T65...0...F39; (Females) T65...0...F43; and, J55...0...P61. Higher scores per polarity are indicative of strength and the attendant lower score for the opposite of the pair indicates

less preference for the individual in the particular situation or environment being considered while testing.

Rather than measure continuous variables, as with most other instruments, the theory underlying the MBTI asserts that the preference represents a fundamental or a qualitative difference, between introverts and extroverts,
for example. Most psychometricians, on the other hand, would begin from the assumption that extroversion-introversion is a continuous, normally distributed psychological dimension or trait. For the type theorist, a type table, containing the percentages of each of the 16 types, is the equivalent of a table of norms (Myers and McCaulley, 1985).

Procedures

Purpose of the Data Collection

This research was designed to utilize archival data for investigating the demographic data and the resulting scores from two psychometric instruments, separately or together, for relatedness indicators to Success/Failure on the USMLE Step 1.

Participants in the Data Collection

The experimental population was drawn from medical students enrolled only at U.S. based medical schools. Medical students at the University of Kansas School of Medicine were offered participation during their medical school orientation up to within two months prior to sitting for the USMLE Step 1. Students at UMKC,IPP usually tested immediately upon admission or shortly afterwards, as the diagnostic battery of tests administered was an aggressive attempt to identify any possible learning disabilities or

difficulties in this group who had already failed on the USMLE Step 1 at least once. Specific curricular time was regularly scheduled and selected faculty members assigned for this data gathering at both institutions. University research protocols were reportedly in strict compliance as well.

Data Collection of Demographics

Investigation for ethnicity/race and gender was conducted by direct interview by assigned faculty members at the time of testing. Reading from a simple questionnaire (Appendix), the students were individually asked, "Please state your ethnicity or race," and, "Please state your gender." After recording the responses, the faculty person then thanked the student for sharing the information.

Data Collection of Adult Personality Inventory and Myers-Briggs Type Indicator Testing

Administration of the Adult Personality Inventory and the Myers-Briggs Type Indicator occurred at the respective university settings during specific curricular time. The University of Missouri, Kansas City, Institute for Professional Preparation provided the software program TestPlus (Krug, 1985) to score the Adult Personality Inventory. MetriTech, Inc. of Champaign, Illinois, supported the API research by offering availability of expertise and testing materials at reduced rates or through lending.

Computer programs were utilized to score the answer sheets from the API using the Test Plus program. The Center for the Applications of Psychological Type of Gainesville, Florida, supported the MBTI research by offering computer scoring at reduced rates, literature at reduced rates or donation, and availability of expertise and testing materials at reduced rates or through lending.

Test Scores in Data Collection

The API was administered to the volunteers at varying times over the course of a 2-year academic period, from 1992 to 1994. These 179 subjects comprised 37% of the student population available (n=486). API scores were generated by the Test Plus computer program (Krug, 1985) for each subject who completed a valid profile.

The MBTI was administered to volunteers during the 2-year period from 1992 to 1994. These 209 subjects comprised 43% of the student population available (n=486). For each subject who completed a valid profile, computer generated scores were provided by The Center for the Applications of Psychological Type from the research instrument, Form F.

The API and MBTI combination score for the 2 year period yielded 171 subjects, which represented 35% of the student population sampled (n=486).

To honor confidentiality, testing results were individually presented to each student, either verbally or in written form through confidential mailings, as they chose. Additionally, a seminar for groups was provided covering the application of the MBTI results to their personal and professional interactions beginning in the medical school classrooms through clinical rotations,

continuing into residencies and traveling toward their respective medical practice futures. It was assumed that self-reporting by participants was truthful and reliable.

Statistical Procedures Applied to the Data

Statistical analyses used for exploring group differences included the Chi Square/contingency analysis and discriminant function analysis. These were provided by

the Statistical Package for the Social Sciences (SPSS for Windows) (1998). The level of statistical significance was placed at .05 alpha. Therefore, any results found to be at p=.05 or less were deemed significant.

In Hypotheses 1 and 2, statistical analyses for group differences were performed on the demographic data gathered from the sample subjects using the Chi Square analysis for categorical variables and the significant differences related to United States Medical Licensing Examination Step 1 (USMLE Step 1) and Ethnicity/Race and Gender. The independent variables were Ethnicity/Race and Gender. The dependent variable was USMLE Step 1 outcome (Success/Fail).

In Hypothesis 3, statistical analyses for group differences were performed on the data gathered from the Adult Personality Inventory (API) and Success/Fail groups (on the USMLE Step 1) using univariate F-tests with follow-up analyses of significances by running stepwise discriminant function analysis.

For Hypothesis 4, a 2x2 Chi-Square analysis was performed on each of the dichotomous Myers-Briggs Type Indicator (MBTI) dimensions and Success/Fail on USMLE Step 1. A Chi Square analyses were then performed to determine any interaction between the E/I and T/F dimensions. 2x2 contingency analyses were performed on the E/I and Success/Fail dimension for both levels of the T/F dimension and a 2x2 contingency analyses of the T/F and Success/Fail dimensions were run for each level of the E/I dimension. Contingency analyses were performed on T/F by Success/Fail dimensions for levels of E/I to determine observed and expected frequencies.

Contingency analyses were performed on each of the 16 MBTI types by Success/Fail on the USMLE Step 1 to determine any association.

For Hypothesis 5, a discriminant function analysis was performed using Gender, Ethnicity/Race, MBTI dimensions, and API scales to determine any relationships to Success/Failure on the USMLE, Step 1. Analysis of predictors were also performed to yield Pass/Fail classification rates.

The primary purpose of this study was to assess archived testing and demographical data from medical students in United States based medical schools to determine the presence of psychological or demographic factor(s), which appear associated with success or failure on the United States Medical Licensing Examination Step 1 (USMLE Step 1). Analyses were made on demographic data for (1) Ethnicity/Race, (2) Gender, and psychological information derived from assessment with (3) the Adult Personality Inventory (API), (4) the Myers-Briggs Type Indicator (MBTI), and (5) a combined testing on any prior significant results for Ethnicity/Race, Gender, the API and the MBTI when examined with the Success/Failure dimension.

If associations are discovered, the educational focus regarding the board examination could be expanded from primarily post-exam remediation to a proactive preparation for students targeted as "at risk to fail." This application would then fall in line with the behavioral impact upon health and functioning in the field of health psychology thought today.

CHAPTER III

RESULTS

This chapter is divided into two parts. First, the descriptive statistics for participants are reported. The second section will present the findings of the data analysis with respect to the research hypotheses. Each hypothesis is discussed separately. The probability level of alpha is set at .05 throughout the analyses.

Descriptive Statistics

A total of 486 medical students at the University of Kansas Medical School and the University of Missouri, Kansas City, Institute for Professional Preparation were offered the opportunity to participate in this research. Of these, 373 passed and 113 failed the USMLE Step 1.

Since the research was designed to examine for differences between medical students who pass the U. S. Medical Licensing Examination Step 1 (USMLE Step 1) and those who fail, the descriptive statistics for these two groups were calculated. The results showing percentages are presented in Table 1. The results showing means and standard deviations are presented in Table 2.

Demographic numbers for Ethnicity/Race and Gender are included. Sample numbers were: 37 Asians, 52 Blacks, 371 Caucasians/Whites, 13 Hispanic and 13 Native Americans. 184 were females and 302 were males.

179 medical students took the Adult Personality Inventory (API), 209 wrote the Myers-Briggs Type Indicator (MBTI) and 171 completed both the API and the MBTI.

Table 1.

Descriptive Variable Totals and Subtotals and Percentages for Medical Students Who Succeed or Fail on the United States Medical Licensing Examination Step 1 (USMLE Step 1)

Variables	N	% Passed
Pass	373	77
Fail	113	23
UMKCipp	109	22
KUSM	377	78
Gender		
Female	184	38
Male	302	62
Ethnicity/Race		
Asian	37	08
Black	52	11
Cauc/White	371	76
Hispanic	13	03
Native Am	13	03
API+MBTI	171	35
Myers-Briggs Type Indicator (MBTI)	209	
Extraversion	120	25
Introversion	89	18
Sensing	115	24
Intuition	94	19
Thinking	92	19
Feeling	117	24
Judgment	136	28
Perception	73	15
ISTJ	23	96
ISFJ	21	67
INFJ	8	50
INTJ	7	100
ISTP	5	80
ISFP	4	75

Table 1. (continued)

INFP	12	50
INTP	8	100
ESTP	8	88
ESFP	5	80
ENFP	15	60
ENTP	14	93
ESTJ	17	88
ESFJ	33	46
ENFJ	19	27
ENTJ	10	90

Table 2.

Descriptive Variable Totals and Subtotals, Means and Standard Deviations for Medical Students who Succeed or Fail on the United States Medical Licensing Examination Step 1 (USMLE Step 1)

Variables	n	M	S D
Adult Personality Inventory (API)			179
Validity Scales			
Good Impression	179	1.80	1.30
Bad Impression	179	2.40	1.90
Infrequency	179	3.15	2.13
Uncertainty	179	4.19	4.01
Personal Characteristics			
Extroverted	179	5.36	2.23
Adjusted	179	5.01	1.88
Tough-Minded	179	5.58	1.99
Independent	179	6.01	2.06
Disciplined	179	5.19	2.22
Creative	179	6.49	1.80
Enterprising	179	6.13	2.24
Interpersonal Style			
Caring	179	5.53	2.30
Adapting	179	5.05	2.13
Submissive	179	5.50	1.78
Uncaring	179	5.41	2.16

Table 2 (continued)

Withdrawn	179	5.88	1.93
Nonconforming	179	5.24	2.00
Sociable	179	5.46	1.95
Assertive	179	5.03	2.10
Career/Lifestyle Factors			
Practical	179	5.31	2.02
Scientific	179	6.12	2.04
Aesthetic	179	6.75	1.72
Social	179	5.92	1.99
Competitive	179	7.01	1.75
Structured	179	5.09	2.10

Research Hypotheses

Hypothesis # 1

Success/Failure on the USMLE Step 1 is related to Ethnicity/Race.

A 2 x 5 contingency analysis was performed on the Ethnicity/Race (Asian, Black, Caucasian/White, Hispanic, and Native American) by the Success/Failure dimension. In this analysis, a significant chi square was found (χ^2 [4]= 123.54, $p < .001$). The observed and expected frequencies for this analysis are shown in Table 3.

From Table 3, it can be seen that Asians and Caucasians/Whites were over-represented in the Pass category, while Blacks were over-represented in the Fail category. Small sample sizes for Hispanic and Native American categories make interpretation of results somewhat problematic. However, there appears to be little relationship between being Hispanic or Native American and Success/Failure on the USMLE Step 1.

Table 3.

Observed and Expected Frequencies for Ethnicity/Race by Success/Failure on the USMLE Step 1

		Asian	Black	C/White	Hispanic	Native Am.
Fail	Ob	8.0	43.0	53.0	3.0	3.0
	Ex	8.6	12.1	86.3	3.0	3.0
Pass	Ob	29.0	9.0	318.0	10.0	10.0
	Ex	28.4	39.9	284.7	10.0	10.0

χ^2 [4] = 123.54, p<.001

Hypothesis # 2

Success/Failure on the USMLE Step 1 is related to Gender.

To address this hypothesis, a 2 x 2 contingency analysis was performed on the Gender by Success/Failure dimension. A significant effect of Gender was found (χ^2[1]= 16.27, $p < .001$). Females were over-represented in the Fail category while males were over-represented in the Pass category. The observed and expected frequencies for the Gender x Success/Failure analysis are shown in Table 4.

Hypothesis # 3

Success/Failure on the USMLE Step 1 is related to results from the Adult Personality Inventory.

Univariate F tests for each of the API scales were examined and the means, standard deviations and F ratios are presented in Table 5. Significant differences were found for the Adapting, Assertive, Competitive, Disciplined, Enterprising, Extroverted, Independent,

Table 4.

Observed and Expected Frequencies for Gender by Success/ Failure on the USMLE Step 1

		Males	Females
Fail	Observed	52.0	61.0
	Expected	70.2	42.8
Pass	Observed	250.0	123.0
	Expected	231.8	141.2

$\chi^2[1] = 16.27, p<.001$

Scientific, Uncaring, and Withdrawn scales of the API. Those who passed the examination had significantly higher mean scores on the Adapting, Competitive, and Withdrawn scales, while those who failed scored higher on the Assertive, Disciplined, Enterprising, Extroverted, Independent, Scientific, and Uncaring scales of the API.

Table 5.

Means, Standard Deviations, Univariate F's and Significance of Adult Personality Inventory Scales by Success/Failure on the USMLE Step 1

API Scale	Fail (N=56) Mean	SD	Pass (N=123) Mean	SD	F (1, 177)	p
Adapting	4.53	2.11	5.28	2.11	4.88	.028*
Adjusted	4.77	2.06	5.11	1.79	1.23	.269
Aesthetic	7.07	1.69	6.61	1.73	2.78	.097
Assertive	5.64	2.10	4.76	2.05	7.02	.009**
Caring	5.08	2.43	5.74	2.22	3.18	.076
Competitive	6.52	1.87	7.24	1.65	6.634	.011*
Creative	6.46	1.76	6.50	1.82	.026	.872
Disciplined	5.81	1.77	4.91	2.35	6.58	.011*

Table 5. (continued)

Enterprising	7.02	1.92	5.72	2.27	13.88	.001**
Extroverted	6.08	2.11	5.02	2.21	9.10	.003**
Independent	6.73	2.00	5.68	2.00	10.56	.001**
Nonconforming	5.32	1.77	5.21	2.10	.12	.733
Practical	5.23	2.12	5.35	1.98	.15	.702
Scientific	6.64	2.24	5.88	1.90	5.56	.019*
Sociable	5.75	1.87	5.33	1.98	1.75	.187
Social	5.82	1.85	5.96	2.05	.21	.645
Structured	5.38	1.87	4.96	2.19	1.61	.206
Submissive	5.40	1.88	5.55	1.74	.257	.612
Tough-Minded	5.71	2.17	5.53	1.92	.308	.580
Uncaring	6.08	2.24	5.10	2.06	8.22	.005**
Withdrawn	5.14	1.88	6.21	1.87	12.56	.001**.

* p<.05, ** p<.01, *** p<.001

The standardized discriminant function coefficients and the group centroids for this analysis are presented in Table 6. Five of the API scales had coefficients greater than .25. These were Competitive, Disciplined, Extroverted, Scientific, and Uncaring. The group centroids show that those who failed the USMLE Step 1 scored higher on the function, while those who passed the USMLE Step 1 scored lower on the function. Those who failed were characterized by relatively higher scores on Extroverted, Scientific, and Uncaring and by relatively lower scores on Competitive and Disciplined. Those who passed exhibited the reverse of this pattern.

In order to determine the relative magnitude of the significant API scales in predicting Success/Failure on the USMLE Step 1, a follow-up Discriminant Function Analysis (Betz, 1987; Pedhazur, 1982) was run. Prior probabilities, reflecting the overall sample pass rates, of .687 (Pass) and .313 (Fail) were used in this analysis. The Canonical Discriminant Function was significant (Eigenvalue = .491, Canonical R= .574, Wilks' Lambda= .671, χ^2 (21)= 66.48, p < .0005).

Table 6.

Standardized Discriminant Function Coefficients and Group Centroids for Discriminant Function Analysis Using the API Scales

API Scale	Standardized Discriminant Function Coefficient
Adapting	0.29
Adjusted	0.04
Aesthetic	-1.00
Assertive	-0.03
Caring	-0.09
Competitive	1.21
Creative	0.59
Disciplined	-0.35
Enterprising	-0.18
Extroverted	-0.44
Independent	0.02
Nonconforming	-1.11
Practical	0.73
Scientific	0.12
Sociable	1.46
Social	-0.03
Structured	0.71
Submissive	-1.03
Tough Minded	-1.15
Uncaring	1.15
Withdrawn	1.87

Group	Centroids
Fail	-1.03
Pass	.47

The classification results are shown in Table 7. As can be seen in this table, the function was much better at teasing out relationships for those who passed (91.9% correct) than those who failed (53.6%). The percentage of overall correct classifications was 79.9%.

Table 7.

Classification Results for Discriminant Functions Analysis Using the API Scales

Actual Group	N	Predicted Group	
		Fail	Pass
Fail	56	30 53.6%	26 46.4%
Pass	123	10 8.1%	113 91.9%

Hypothesis # 4

Success/Failure on the USMLE Step 1 is related to results from the Myers-Briggs Type Indicator.

This hypothesis pertained to the relationship between classification by the Myers-Briggs Type Indicator (MBTI) (Myers and McCaulley, 1985) and Success/Failure on the USMLE Step 1. In order to analyze these data, a 2 x 2 contingency analysis of each of the dichotomous MBTI dimensions by the Success/Failure dimension was performed. The results of these analyses are summarized in Table 8. No significant differences were found for either the Sensing/iNtuition or Judging/Perceiving distinctions. However, significant differences were found for both the Extraversion/ Introversion (E/I: χ^2 [1]= 4.84, p<.028) and Thinking/ Feeling dimensions (T/F: χ^2 [1]= 40.97, p < .001).

Table 8.

Chi-square Analyses on MBTI Dimensions by Success/Failure on the USMLE Step 1

MBTI	χ^2	df	p
Extraversion/Introversion (E/I)	4.84	1	.028*
Sensing/Intuition (S/N)	.94	1	.332
Thinking/Feeling (T/F)	40.97	1	.0001**
Judgment/Perception (J/P)	2.84	1	.092

The observed and expected frequencies for the E/I dimension are shown in Table 9. These results suggest that Extraverts are over-represented in the Fail category, while Introverts are over-represented in the Pass category.

Table 9.

Observed and Expected Frequencies for Success/Failure on the USMLE Step 1 by Extraversion/Introversion (MBTI)

		Extraversion	Introversion
Fail	Observed	44.0	20.0
	Expected	36.7	27.3
Pass	Observed	76.0	69.0
	Expected	83.3	61.7

χ^2 [1] = 4.84, p<.028

The observed and expected frequencies for the Thinking/ Feeling dimension are shown in Table 10. These results suggest that those in the Thinking category are over

represented in the Pass category, while those in the Feeling category are over represented in the Fail category.

Table 10.

Observed and Expected Frequencies for Success/Failure on the USMLE Step 1 by Thinking/Feeling (MBTI)

		Thinking	Feeling
Fail	Observed	7.0	57.0
	Expected	28.2	35.8
Pass	Observed	85.0	60.0
	Expected	63.8	81.2

χ^2 [1] = 40.97, p<.0001

In order to determine if there was an interaction between the Extraversion/Introversion and Thinking/Feeling dimensions, 2 x 2 contingency analyses involving the E/I and Success/Failure dimensions were performed for both levels of the Thinking/Feeling dimension, while 2 x 2 contingency analyses involving the Thinking/Feeling and Success/Failure dimensions were run for each level of the E/I dimension. The results of these analyses are summarized in Table 11. No significant effects were found for the E/I dimension on Success/Failure for either level of the Thinking/Feeling dimension. However, significant effects of Thinking/Feeling and Success/Failure were found for both Extraverts and Introverts.

Table 11.

Chi-square Analyses on MBTI Dimensions by Success/Failure on the USMLE Step 1

MBTI	χ^2	df	p
Thinking (T)			
Extroversion/Introversion (E/I)	1.00	1	.316
Feeling (F)			
Extroversion/Introversion (E/I)	2.79	1	.095
Extroversion (E)			
Thinking/Feeling (T/F)	24.97	1	.0001*
Introversion (I)			
Thinking/Feeling (T/F)	15.16	1	.0001*

* p<.05, ** p<.01, *** p<.001

The observed and expected frequencies for Success/ Failure by the Thinking/Feeling dimensions for levels of E/I are shown in Table 12. Taken together, these results suggest that for both extraverts and introverts, the Feeling orientation is over-represented in the Fail category, while the Thinking orientation is over represented in the Pass category. Although extraverts tend to be over-represented in the Fail category when the Thinking/Feeling distinction is ignored, those extraverts who happen to be characterized by the Thinking orientation are more likely to Pass than are those characterized by the Feeling orientation, In addition, contingency analyses were performed for each of the sixteen MBTI types by Success/Failure on the USMLE Step 1. Results of these analyses are shown in Table 13.

Table 12.

Observed and Expected Frequencies for Success/Failure on the USMLE Step 1 by Thinking/Feeling for Extraverts and Introverts (MBTI)

	Pass	Fail	Pass Rate
Extraversion Thinking	44	5	90%
Extraversion Feeling	32	39	45%
Introversion Thinking	41	2	95%
Introversion Feeling	28	18	61%

Two of the types were significantly associated with passing USMLE Step 1, ISTJ and ENTP. Two MBTI types were significantly associated with failing the USMLE Step 1, ESFJ and ENFJ. Consistent with previous analyses, each of the types that were most likely to fail displayed the Extraverted attitude, the Feeling orientation and, also, Judging perception. The MBTI types significantly associated with passing the USMLE Step 1 displayed the Thinking orientation. Further, the Sensing and Intuitive orientations were evenly divided among the MBTI types associated with both passing and failing.

Table 13.

Contingency Analyses of the 16 Myers-Briggs Types by Success/Failure on the USMLE Step 1

Type	Total N	Pass		Fail		χ^2	p
		N	Pct.	N	Pct.		
ISTJ	23	22	95.7	1	4.3	8.40	.004*
ISFJ	21	14	66.7	7	33.3	.08	.78

Table 13. (continued)

INFJ	8	4	50.0	4	50.0	1.47	.23
INTJ	7	7	100.0	0	0.0	3.20	.07
ISTP	5	4	80.0	1	20.0	.27	.60
ISFP	4	3	75.0	1	25.0	.06	.81
INFP	12	6	50.0	6	50.0	2.25	.13
INTP	8	8	100.0	0	0.0	3.67	.06
ESTP	8	7	87.5	1	12.5	1.29	.26
ESFP	5	4	80.0	1	20.0	.27	.60
ENFP	15	9	60.0	6	40.0	.60	.41
ENTP	14	13	92.9	1	7.1	3.89	.05*
ESTJ	17	15	88.2	2	11.8	3.10	.08
ESFJ	33	15	45.5	18	54.5	10.56	.001*
ENFJ	19	5	26.3	14	73.7	18.24	.0001*
ENTJ	10	9	90.0	1	10.0	2.10	.15

Hypothesis # 5

Success/Failure on the USMLE Step 1 is related to a combination of Ethnicity/Race, Gender, MBTI and API results.

Hypothesis 5 concerns the relationship between Passing or Failing the USMLE Step 1 and scores on both the MBTI and the API considered together. In order to investigate this question a discriminant function analysis was performed with the API scales, the MBTI dimensions, Gender, and Ethnicity/Race. The discriminant function was significant (Eigenvalue= .883, Canonical R= .685, Wilks' Lambda= .531, χ^2 [30]= 97.47, $p < .0005$). The standardized canonical discriminant function coefficients and group centroids for this analysis are shown in Table 14. Overall, those in the Fail category scored lowest on the function (Centroid = -1.375) while those who Passed (Centroid = .635) scored highest.

Table 14.

Standardized Discriminant Function Coefficients and Group Centroids for Discriminant Function Analysis Using Gender, Ethnicity/Race and API and MBTI Scales

Scale	Standardized Discriminant Function
Female	-0.16
Hispanic	-0.03
Asian	-0.08
Black	-0.41
Caucasian/White	0.09
Extraversion	-0.04
Sensing	0.13
Thinking	0.57
Judging	0.10
Extroverted	0.40
Adjusted	-0.65
Tough Minded	-0.20
Independent	-0.11
Disciplined	-0.28
Creative	1.45
Enterprising	-0.62
Caring	-0.42
Adapting	0.01
Withdrawn	1.20
Submissive	-0.60
Uncaring	0.14
Nonconforming	-0.38
Sociable	-0.02
Assertive	0.75
Practical	0.71
Scientific	0.26
Aesthetic	-0.75
Social	0.00
Competitive	0.95
Structured	0.76

Group	Group Centroids
Pass	.635
Fail	-1.375

Analysis of the discriminant function coefficients shows that those who passed the USMLE Step 1 scored higher on the API in the areas of Competitive and Extroverted, and lower on Enterprising, while being characterized by the Thinking orientation of the MBTI. Further, those who passed were more likely to be male and Caucasian/White and significantly less likely to be Black. Those who failed the USMLE Step 1 tended to score higher on the API Enterprising and lower on Competitive and Extroverted, while being characterized by the MBTI Feeling orientation. Additionally, those who failed tended to be Black, female and were less likely to be Caucasian/White.

The correct classification rates for this analysis are shown in Table 15. Overall, 86.0% of cases were correctly classified by the function.

Table 15.

Classification Results for Discriminant Functions Analysis Using Gender, Ethnicity/Race and API and MBTI Scales

Actual Group	N	Predicted Group	
		Fail	Pass
Fail	54 87.0%	47 13.0%	17
Pass	117 14.5%	7 85.5%	100

CHAPTER IV

DISCUSSION

Although cognitive measures, most commonly undergraduate grade point average (GPA) and scores on the Medical College Aptitude Test (MCAT, 1977) are widely used to search for relationships between success in medical school and on the United States Medical Licensing Examination Step 1 (USMLE Step 1), the use of both has been criticized (Anderson, 1984, 1990; Brooks, Jackson, Hoffman & Hand, Jr., 1981; Donnelly, Yindra, Long, Rosenfeld, et al., 1986; Golman & Berry, 1981; McGuire, 1982; Nowacek, Pullen, Short & Blumner, 1987; Powers, 1984; Ramos, Croen, & Haddow, 1986; Sedlacek & Prieto, 1990). Generally, correlations between MCAT scores and performance on the USMLE Step 1 are approximately .50 in magnitude, suggesting that only about 25 percent of the variance in USMLE Step 1 predictions is accounted for by these measures (Ramos, Croen & Haddow, 1986).

Cognitive measures such as the MCAT have also been criticized for their lack of predictive validity among minority students, due in some part to the fact that they do not measure experiential or contextual intelligence, relying instead on primarily scientific abilities (Sedlacek & Prieto, 1990). A different opinion was related by Xu, Veloski, Johat, Gonnella & Bacharach (1993), in their study of 140 Asian-American and 2,269 Caucasian/white medical school graduates. They found the MCAT reading score to be the major predictor for Asian-Americans' lower scores on NBME, I and II (now

USMLE Steps 1 & 2). The authors state that these minority students were either first or second-generation immigrants but do not indicate whether English was a first or "cradle" language. Correlations between the MCAT and USMLE Step 1 scores have been shown to be lower among Black than Caucasian/white medical students (Johnson, Lloyd, Jones & Anderson, 1986). Although noncognitive measures, such as personality variables, interpersonal skills, anxiety, experienced stress, and the like have been studied less frequently than cognitive measures (Hojat, Vogel, Zeleznik & Borenstein, 1988), recent studies have indicated that personality and motivational variables independently predict success on the USMLE Step 1, as well as adding substantially to the prediction of USMLE Step 1 scores when combined with cognitive measures such as the MCAT and year 1 and year 2 course examination scores (Gonnella, Hojat, Erdmann & Veloski, 1993; Green, Peters, & Webster, 1991; Hojat, Robeson, Damjanov, Veloski, Glaser & Gonnella, 1993; Hojat, Vogel, Zeleznik & Borenstein, 1988). In their gender research of graduate medical students, Arnold, Willoughby, Calkin and Jenkins (1981) found cognitive characteristics associated with males and noncognitive attributes associated with females' performance success. Harward (1981) found no such significant difference between genders for performance in medical school.

In light of the increasing interest in noncognitive factors associated with performance on the USMLE (Myers, 1971, Phelan, 1993), the efficiency of using two measures of personality, the Adult Personality Inventory (API) (Krug, 1984) and the Myers-Briggs Type Indicator (MBTI) (Myers & McCaulley, 1985), to provide elements relating to Success/Failure on the United States Medical Licensing Examination Step 1

was examined. The API follows in the tradition of the factor analytic personality research of Cattell and represents a quantitative assessment of several personality and interest dimensions. The MBTI follows from the psychodynamic tradition, representing an attempt to measure the personality types suggested by Jung (Myers & McCaulley, 1985), and hence, is a qualitative assessment of personality in that sense. However, the type results are also available with numerically weighted scores. In addition, ethnicity and gender were included in this study to provide exploration into demographic data.

Ethnicity/Race and Gender

Since research has consistently linked Gender and Ethnicity/Race to variations in success in educational settings (Calkins, Arnold & Willoughby, 1987, Eccles & Adler, 1984), the influence of Gender and Ethnicity/Race on success or failure on the USMLE Step 1 was assessed, both independently, and in conjunction with the API and MBTI results.

As expected, analyses of Ethnicity/Race differences in Success/Failure on the USMLE Step 1 showed that Asian and Caucasian/ White students were over-represented in the Pass category, while Blacks were over-represented in the Fail category. However, the compounding factors of economic support, time and travel distance for attendance in the UMKC, Institute for Professional Preparation remedial on-site programs must be considered, as these subjects provided the bulk (n=109) of the total failed subject population (n=113). Insufficient numbers of Hispanic and Native-American students in the sample precluded firm conclusions about the Success/Failure of these groups on the USMLE Step 1. In the analyses of Gender and Success/Failure on the USMLE Step 1,

males were found to be over-represented in the Pass category, while females were over-represented in the Fail category. Again, the confounding factors of finances, time and distance must be considered.

Adult Personality Inventory

Analyses involving the API showed a significant overall difference on the API scales between those who passed and those who failed the USMLE Step 1. Univariate analyses revealed that ten of the 21 scales showed significant differences between those who passed and those who failed. Those who passed the USMLE Step 1 scored relatively higher on Adapting. Competitiveness and Withdrawn than did those who failed, while those who failed the USMLE Step 1 scored relatively higher on Assertive, Enterprising, Extraversion, Independent and Uncaring. Weaker tendencies to score higher on the Scientific and Disciplined scales by those who failed the USMLE Step 1 were also found.

The finding that the Competitiveness and Extraversion scales of the API are related to Success/Failure on the USMLE Step 1 is quite consistent with the growing body of knowledge linking noncognitive variables to academic success (Krug, 1984). That Introversion is associated with passing the USMLE Step 1 is understandable considering that introverts are more likely to seek graduate and professional education than are extraverts and that introverts are attracted to the inner world of concepts and ideas (McCaulley, 1987), a necessary attribute for educational achievement. That the API career interest scale of Competitiveness is associated with Success on the USMLE Step 1 is also understandable, since passing the USMLE Step 1 is necessary for continued

achievement and excellence in pursuing career goals in competitive fields such as medicine.

In differentiating between pass and fail groups, however, these results are inconsistent with findings from previous research that has found few of the personality traits assessed by the API to be associated with academic success (Green, Peters & Webster, 1991). In one study of the academic success of medical students in which a similar personality instrument, the 16-PF (Cattell, Saunders & Stice, 1950), was used to predict academic success in medical school, none of the scales was associated with academic success (Green, Peters & Webster, 1991). Hence, neither the 16-PF nor the API, which is partially based on the 16-PF, may be adequate to assess the personality variables associated with academic success. Alternatively, perhaps, personality is not important to academic success.

Myers-Briggs Type Indicator

Contingency analyses showed that the Extraversion/ Introversion (E/I) and Thinking/Feeling (T/F) functions of the MBTI were significantly related to Success or Failure on the USMLE Step 1, particularly the T/F orientation. Participants characterized by the Introverted attitude and the Thinking Process were most likely to pass the USMLE Step 1. Contingency analyses of both the E/I and T/F orientations and Success/Failure suggest that, although extraverts may be over-represented in the Fail category, those who are characterized by the Thinking orientation are more likely to pass the USMLE Step 1 than those characterized by the Feeling orientation even within the more failure prone Extraversion group.

Further analyses of the sixteen MBTI types tended to confirm these findings, showing that the ISTJ and ENTP types were significantly more likely to pass the USMLE Step 1, while the ESFJ and ENFJ types were significantly more likely to fail the USMLE Step 1. The types associated with passing the USMLE Step 1 were most often characterized by Introversion and Thinking, while those who failed were characterized by the Extraversion and Feeling orientations.

These results are also consistent with previous findings in which the Feeling orientation has been shown to be most associated with failure on the USMLE (O'Donnell, 1982). This would be expected since Thinking is associated with analytic ability, objectivity, and good critical judgment (McCaulley, 1987). That the E/I attitude appears more related to Success/ Failure only among female medical students suggests that it is more important for female medical students to be introverted rather than extraverted. Since Extraversion is associated with attention being drawn towards people and objects in the environment coupled with a desire to act on the environment in order to increase stimulation and assure guidance, these women would exhibit the more desired Introverted characteristics of being internally controlled and working with their inner world of ideas (McCaulley, 1987).

Although in this study no data were collected bearing on this difference, it is possible that variation in the social roles of men and women, in which women are expected to attend to matters (e.g., home and family) other than their own personal achievement may serve to distract the extraverted female from rigors of an educational

environment more suited to the introvert. The lack of multiple roles among males may account for the lack of a significant association between E/I and Success/Failure.

API and MBTI with Gender and Ethnicity/Race

A final discriminant function analysis was performed using the API and MBTI scales as well as Gender and Ethnicity/Race in search of relationships to Success/Failure on the USMLE Step 1. Results of this analysis were similar to those found in the analysis of the API scales, MBTI functions, Gender and Ethnicity/Race alone. Those who passed were more likely to be Caucasian/White and male, and significantly less likely to be Black. Those who failed were more likely to be Black and female and less likely to be Caucasian/White. However, only the Thinking/Feeling dimension of the MBTI and the Extraverted, Enterprising, and Competitive scales of the API remained as significant indicators of a possible association with Success or Failure. The small numbers of 4 letter MBTI typologies precluded their inclusion in favor of the more robust numbers of the individual preferences. Correct classification of Failures in this model was 87.0%, while correct classification of Successes was 85.5%. The overall correct classification rate was 86.0%. Taken together, these results suggest that assessments of personality factors provided by a single personality inventory may not be adequate to assess a possibly broad and varied number of personality attributes that may be associated with academic success in general and Success/Failure on the USMLE Step 1 in particular.

In sum, the present research found that non-cognitive variables such as Competitiveness and Extraversion, as measured by the API, and personality types

characterized by the Thinking orientation, as measured by the MBTI, are significantly related to academic success on the USMLE Step 1 as were the demographic variables for Caucasian/white and male. The final non-cognitive variables significant in association with failure on the USMLE Step 1 were the demographic variables for Black and female plus Competitiveness (low), Extroversion (low) and Enterprising (high) as measured by the API and personality types, which were characterized by the Feeling orientation, as measured by the MBTI. Although the small sample sizes in some of the four letter MBTI typologies precluded inclusion in the final analysis, it is of interest to note that previous analysis confirmed that the ISTJ and ENTP types, characterized by Introversion and Thinking were associated with success on the USMLE Step 1, while those medical students who failed exhibited characteristics of the Extraversion and Feeling orientations exhibited in the ESTJ and ENFJ types

Further, the present research points to the weaknesses of using any single personality instrument to suggest associations with Success/Failure on the USMLE Step 1 since both the API and MBTI made independent contributions regarding these relationships. Sample populations varied between these groups, as indicated in Tables 1 and 2, .depending upon voluntary selections.

Implications for Counseling Psychology Practice

The growth in the number of positions open to counseling psychologists in health care settings (Swanson, et al., 1994) coincides with a growing recognition that counseling psychologists can perform multiple roles in the health industry ranging from being the traditional counselors providing services for persons suffering from physical illnesses to

psychoeducators, consultants and researchers (Kagan, et al., 1988). Findings from the current research have implications for assessment, intervention (preventive and remedial), and research.

This research has demonstrated the usefulness of at least some measures of personality functioning in researching academic success among medical students in terms of Success or Failure on the USMLE Step 1. Considering that the cost-effectiveness of medical education has been a growing concern among health care professionals as well as recipients, the identification of personality factors associated with Success/Failure on the USMLE Step 1 may be of considerable value in reducing the costs incurred by education of students who fail in medical school.

Further, identification of noncognitive factors associated with Success/Failure may lead to development of psychologically oriented interventions that either prevent failure or assist at-risk medical students to succeed. For instance, counseling psychologists could participate in the development and management of counseling or educational interventions targeted toward at-risk medical students in terms of the factors found to appear to be associated with success or failure on the USMLE Step 1 in the present study. These could take the form of "early intervention," teaching skills or providing support for adaptation to the rigors of medical school, or of remediation, such as counseling and education of medical students who have failed the USMLE Step 1 previously. (Blocher, 1981; Bohart, 1988; Ford, 1985; Klippel & DeJoy, 1984; Patton, 1992; Stone, Cohen & Adler, 1979; Swanson, et al, 1994; Tanney, 1991; Tucker, 1991; Watkins, 1985).

The American Association of Medical Colleges is now promoting use of the MBTI on all medical students for application to all areas of their medical education (private conversation with Dr. Mary McCaulley, November, 2002). For example, understanding how MBTI type differences among medical students and their professors or preceptors can be identified and moved toward resolution are presented in depth by Dr. Gordon Lawrence *in People Types and Tiger Stripes (1993)* and Drs. Judith Provost and Scott Anchors in *Applications of the Myers-Briggs Type Indicator in Higher Education (1987).* The counseling psychologist could easily move from administering the MBTI and reporting those results (as in Tables 16-20) to enhancing the academic experience and relationships (Lawrence, 1993 and Provost & Anchors, 1983), including team building (Hirsch 1992a, 1992b), and mediating learning styles and skills (Lawrence, 1993; Provost, 1992; Provost & Anchors, 1987; and, Stice, 1987). Career counseling strategies and information are available for both the API (Krug, 1987) and the MBTI (Hammer & MacDaid, 1992, McCaulley, 1983a, 1983b)plus illustrations about choices of medical specialties per type across the years as portrayed in Tables 21-23 (McCaulley, 1983a, 1983b)

Limitations and Recommendations for Future Research

Several limitations to the present research may reduce its generalizability. These limitations may be grouped as due to: (1) sampling, (2) conceptual/theoretical focus of instruments used, and (3) lack of theoretical development regarding the possibility of a relationship of personality and other noncognitive factors with Success/Failure on the USMLE Step 1.

Two problems associated with sampling, small sample size in some areas, and selection bias may limit generalizability of findings. For instance, the small sample size for some demographic segments precluded cross-validation of the findings, which is most important if the findings are to be incorporated into future assessment, counseling, or educational interventions. Further, small numbers of ethnic/racial minorities other than Blacks limit generalizing findings beyond Caucasian/white or Black medical students.

In addition, selection bias undoubtedly limits the generalizability of findings. For instance, participation was voluntary, yielding a sample, which might not be actually representative of the medical student population. Although students from several medical education programs were studied within the UMKC, IPP database, generalizability is limited as the parameters defining student status within these two institutions, such as training programs, student demographics, and the like, are quite different.

A second set of limitations involves the conceptual/ theoretical foundations of the API and the MBTI as they apply to relationships with Success/Failure on the USMLE Step 1. Although based on differing theoretical foundations, both instruments are intended to measure rather broad personality attributes distributed across the general population rather than in a narrowly defined population such as medical students, who surely differ in many respects from non-medical students. Neither instrument was designed specifically to differentiate those who pass from those who fail a test such as the USMLE Step 1. Previous research has shown that general personality measures such as the 16-PF and, for instance, scales based on the Five-Factor model of personality do not account for large amounts of variance in academic success (Green, Peters & Webster,

1991; Rothstein, Paunonen, Rush, & King, 1994). Although some support for the use of both instruments was found, findings indicated that only select scales on each measure contributed uniquely to suggesting associations for Success or Failure on the USMLE Step 1.

The final limitation of the present study has more to do with the current state of theory development in relation to prediction of academic success in medical school. As mentioned earlier, while there are a vast number of studies concerning cognitive factors influencing the achievement of academic success in general, and Success/Failure on the USMLE Step 1 in particular, the number of studies of noncognitive factors, although increasing, is still relatively small in comparison. The result is an apparent lack of theoretical or conceptual development in relation to Success/Failure on the USMLE Step 1 and similar tests. More adequate conceptualization of the role of noncognitive factors in researching Success/Failure on exams such as the USMLE Step 1 might lead to isolation of a few salient and replicable personality variables that are specific to such situations, reducing our reliance on lengthy, overly broad-based personality measures, although sections or subscales of such instruments may be of use.

In short, several recommendations for future research are obvious. The dearth of studies of the personality factors associated with Success/Failure on the USMLE Step 1 among minority students and women suggests that future research must use larger samples of minority students. Results then would be more accurate from studying minority Ethnic/Race populations and Gender groups separately, enable identifying personality attributes associated with academic success specific to minority students and

women, in order to both reduce the costs of education of students who fail in medical school and to design appropriate interventions to prevent failure or to facilitate remediation among those students who have already failed.

Similarly, larger field studies, incorporating larger samples of medical students from diverse educational settings are necessary in order to improve the generalizability of findings. Representative samples and samples large enough to accommodate cross-validation are imperative if the information obtained in similar studies is to be of any practical value.

Future research should be more model or theory-driven. The role of noncognitive factors in academic success in combination with more traditional cognitive measures, such as the MCAT, should be more fully addressed, as well as the role of such environmental variables as variation in instruction across schools, social-ecological variables such as school or work environment.

Future research linked to this data could expand in focus and/or in methods. Inclusion of all the step segments of the USMLE would yield an overview of the entire medical education experience, from admission through coursework, clinical experiences, internship, residency and into professional practice. Expansion of methods could begin with these or similar instruments to study intelligence (Wechsler Adult Intelligence Scale III by Wechsler, 1997), locus of control (I-E Scale by Rotter, 1966), aptitude (MCAT, 1964 and values (Manual Study of Values, Allport, 1980) The API and MBTI both have computer programs for displaying results, namely, the Test Plus for the API (Krug, 1985) and the Selection Ratio Type Table (SRTT) for the MBTI (Granade and Myers, 1987).

The Strong Vocational Interest Blank-Strong Campbell Interest Inventory (Hansen & Campbell, 1985) is a possible tool for expanding the area of career counseling, especially for the undecided college student. Past researched information is available for medical students facing educational quandaries and residency choices. For example, Tables 16-20 illustrate the MBTI SRTTs for medical students across a 30 year longitudinal study and Tables 21-23 show specialty choices by these medical students, numbering several thousands (McCaulley 1977, 1978 and Stilwell, Wallick, Thal & Burleson, 2000). Demographic data could be expanded into including medical coursework/performance grades, and possibly cradle language, age, marital status, birth order, parenthood and citizenship status. Presently, the state of theoretical/conceptual development in researching medical school success is rather primitive. Only when experimental design models are developed that cover situation-specific factors, whether personal or environmental, will accuracy of identification, interpretation and implementation of influencing factors be within reach.

Table 16.

Medical Students in the 1950's

N = 5355

ISTJ	ISFJ	INFJ	INTJ
N = 321 % = 5.99	N = 246 % = 4.59	N = 209 % = 3.90	N = 339 % = 6.33
ISTP	ISFP	INFP	INTP
N = 311 % = 5.81	N = 266 % = 4.97	N = 389 % = 7.26	N = 523 % = 9.77
ESTP	ESFP	ENFP	ENTP
N = 278 % = 5.19	N = 300 % = 5.60	N = 429 % = 8.01	N = 362 % = 6.76
ESTJ	ESFJ	ENFJ	ENTJ
N = 428 % = 7.99	N = 360 % = 6.72	N = 266 % = 4.97	N = 326 % = 6.13

	N	%
E	2751	51.37
I	2604	48.63
S	2510	46.87
N	2845	53.13
T	2890	53.97
F	2465	46.03
J	2497	46.63
P	2858	53.37
IJ	1115	20.82
IP	1489	27.81
EP	1369	25.56
EJ	1382	25.81
ST	1338	24.99
SF	1172	21.89
NF	1293	24.15
NT	1552	28.98
SJ	1355	25.30
SP	1155	21.57
NP	1703	31.80
NJ	1142	21.33
TJ	1416	26.44
TP	1474	27.53
FP	1384	25.85
FJ	1081	20.19
IN	1460	27.26
EN	1385	25.86
IS	1144	21.36
ES	1366	25.51
Sdom	1145	21.38
Ndom	1339	25.00
Tdom	1590	29.69
Fdom	1281	23.92

Note: ■ = 1% of sample.

Source of Data: McCaulley, M. H. (1977). The Myers longitudinal medical study (Monograph II, Contract No. 231-76-0051, Health Resources Administration, DHEW). Gainesville, FL: Center for Applications of Psychological Type.

Table 17.

Medical Students in the 1970's

N = 5982

ISTJ	ISFJ	INFJ	INTJ
N = 491 % = 8.21	N = 448 % = 7.49	N = 441 % = 7.37	N = 409 % = 6.84
ISTP	ISFP	INFP	INTP
N = 141 % = 2.36	N = 177 % = 2.96	N = 624 % = 10.43	N = 380 % = 6.35
ESTP	ESFP	ENFP	ENTP
N = 102 % = 1.71	N = 169 % = 2.83	N = 637 % = 10.65	N = 270 % = 4.51
ESTJ	ESFJ	ENFJ	ENTJ
N = 405 % = 6.77	N = 408 % = 6.82	N = 494 % = 8.26	N = 386 % = 6.45

	N	%
E	2871	47.99
I	3111	52.01
S	2341	39.13
N	3641	60.87
T	2584	43.20
F	3398	56.80
J	3482	58.21
P	2500	41.79
IJ	1789	29.91
IP	1322	22.10
EP	1178	19.69
EJ	1693	28.30
ST	1139	19.04
SF	1202	20.09
NF	2196	36.71
NT	1445	24.16
SJ	1752	29.29
SP	589	9.85
NP	1911	31.95
NJ	1730	28.92
TJ	1691	28.27
TP	893	14.93
FP	1607	26.86
FJ	1791	29.94
IN	1854	30.99
EN	1787	29.87
IS	1257	21.01
ES	1084	18.12
Sdom	1210	20.23
Ndom	1757	29.37
Tdom	1312	21.93
Fdom	1703	28.47

Note: ■ = 1% of sample.

Source of Data: McCaulley, M. H. (1978). Application of the Myers-Briggs Type Indicator to medicine and other health professions (Monograph I, Contract No. 231-76-0051, Health Resources Administration, DHEW). Gainesville, FL: Center for Applications of Psychological Type.

Table 18.

Medical Students in the 1990's

N = 3987

ISTJ	ISFJ	INFJ	INTJ
N = 407 % = 10.21	N = 251 % = 6.30	N = 230 % = 5.77	N = 301 % = 7.55
ISTP	ISFP	INFP	INTP
N = 120 % = 3.01	N = 77 % = 1.93	N = 302 % = 7.57	N = 278 % = 6.97
ESTP	ESFP	ENFP	ENTP
N = 123 % = 3.09	N = 90 % = 2.26	N = 367 % = 9.20	N = 264 % = 6.62
ESTJ	ESFJ	ENFJ	ENTJ
N = 385 % = 9.66	N = 253 % = 6.35	N = 244 % = 6.12	N = 295 % = 7.40

	N	%
E	2021	50.69
I	1966	49.31
S	1706	42.79
N	2281	57.21
T	2173	54.50
F	1814	45.50
J	2366	59.34
P	1621	40.66
IJ	1189	29.82
IP	777	19.49
EP	844	21.17
EJ	1177	29.52
ST	1035	25.96
SF	671	16.83
NF	1143	28.67
NT	1138	28.54
SJ	1296	32.51
SP	410	10.28
NP	1211	30.37
NJ	1070	26.84
TJ	1388	34.81
TP	785	19.69
FP	836	20.97
FJ	978	24.53
IN	1111	27.87
EN	1170	29.35
IS	855	21.44
ES	851	21.34
Sdom	871	21.85
Ndom	1162	29.14
Tdom	1078	27.04
Fdom	876	21.97

Note: ■ = 1% of sample.

Source of Data: Stilwell, N. A., Wallick, M. M., Thal, S. E., & Burleson, J. A. (2000, January). Myers-Briggs type and medical specialty choice: A new look at an old question. Teaching and Learning in Medicine: An International Journal, 12(1), 14-20.

Table 19.

Medical Students in the 1990's: Females

N = 1578

ISTJ	ISFJ	INFJ	INTJ
N = 118	N = 123	N = 118	N = 88
% = 7.48	% = 7.79	% = 7.48	% = 5.58
■■■■■■■	■■■■■■■■	■■■■■■■	■■■■■■
ISTP	**ISFP**	**INFP**	**INTP**
N = 21	N = 25	N = 133	N = 88
% = 1.33	% = 1.58	% = 8.43	% = 5.58
■	■■	■■■■■■■■	■■■■■■
ESTP	**ESFP**	**ENFP**	**ENTP**
N = 30	N = 48	N = 165	N = 83
% = 1.90	% = 3.04	% = 10.46	% = 5.26
■■	■■■	■■■■■■■■■■	■■■■■
ESTJ	**ESFJ**	**ENFJ**	**ENTJ**
N = 132	N = 146	N = 148	N = 112
% = 8.37	% = 9.25	% = 9.38	% = 7.10
■■■■■■■■	■■■■■■■■■	■■■■■■■■■	■■■■■■■

	N	%
E	864	54.75
I	714	45.25
S	643	40.75
N	935	59.25
T	672	42.59
F	906	57.41
J	985	62.42
P	593	37.58
IJ	447	28.33
IP	267	16.92
EP	326	20.66
EJ	538	34.09
ST	301	19.07
SF	342	21.67
NF	564	35.74
NT	371	23.51
SJ	519	32.89
SP	124	7.86
NP	469	29.72
NJ	466	29.53
TJ	450	28.52
TP	222	14.07
FP	371	23.51
FJ	535	33.90
IN	427	27.06
EN	508	32.19
IS	287	18.19
ES	356	22.56
Sdom	319	20.22
Ndom	454	28.77
Tdom	353	22.37
Fdom	452	28.64

Note: ■ = 1% of sample.

Source of Data: Stilwell, N. A., Wallick, M. M., Thal, S. E., & Burleson, J. A. (2000, January). Myers-Briggs type and medical specialty choice: A new look at an old question. Teaching and Learning in Medicine: An International Journal, 12(1), 14-20.

Table 20.

Medical Students in the 1990's: Males

N = 2409

ISTJ	ISFJ	INFJ	INTJ
N = 289 % = 12.00	N = 128 % = 5.31	N = 112 % = 4.65	N = 213 % = 8.84
ISTP	ISFP	INFP	INTP
N = 99 % = 4.11	N = 52 % = 2.16	N = 169 % = 7.02	N = 190 % = 7.89
ESTP	ESFP	ENFP	ENTP
N = 93 % = 3.86	N = 42 % = 1.74	N = 202 % = 8.39	N = 181 % = 7.51
ESTJ	ESFJ	ENFJ	ENTJ
N = 253 % = 10.50	N = 107 % = 4.44	N = 96 % = 3.99	N = 183 % = 7.60

	N	%
E	1157	48.03
I	1252	51.97
S	1063	44.13
N	1346	55.87
T	1501	62.31
F	908	37.69
J	1381	57.33
P	1028	42.67
IJ	742	30.80
IP	510	21.17
EP	518	21.50
EJ	639	26.53
ST	734	30.47
SF	329	13.66
NF	579	24.03
NT	767	31.84
SJ	777	32.25
SP	286	11.87
NP	742	30.80
NJ	604	25.07
TJ	938	38.94
TP	563	23.37
FP	465	19.30
FJ	443	18.39
IN	684	28.39
EN	662	27.48
IS	568	23.58
ES	495	20.55
Sdom	552	22.91
Ndom	708	29.39
Tdom	725	30.10
Fdom	424	17.60

Note: ■ = 1% of sample.

Source of Data: Stilwell, N. A., Wallick, M. M., Thal, S. E., & Burleson, J. A. (2000, January). Myers-Briggs type and medical specialty choice: A new look at an old question. Teaching and Learning in Medicine: An International Journal, 12(1), 14-20.

Table 21.

Relative Attractiveness of the Specialties to Each of the Sixteen Types: 1964

(ratio of actual to expected frequency of each specialty within each type)

ISTJ		ISFJ		INFJ		INTJ	
Pathology	1.74*	Anesthesiology	1.76*	Med. Faculty	1.67	Neurology	2.75**
OB Gyn	1.46*	Pediatrics	1.43	Internal Med	1.42*	Research	2.72***
Anesthesiology	1.21	Gen Practice	1.13	Research	1.35	Pathology	1.99**
Gen. Practice	1.07	OB Gyn	.99	Psychiatry	1.26	Psychiatry	1.46
Surgery	1.00	Surgery	.93	Pediatrics	1.07	Internal Med	1.44**
Internal Med.	.99	Med. Faculty	.82	Surgery	.97	Gen Practice	1.02
Med. Faculty	.98	Internal Med	.81	Gen Practice	.96	Anesthesiology	.87
Neurology	.88	Psychiatry	.68	Pathology	.77	Med. Faculty	.78
Pediatrics	.75	Neurology	.53	Neurology	.69	Surgery	.73
Psychiatry	.44*	Pathology	.30	OB Gyn	.68	OB Gyn	.71
Research	.00	Research	.26	Anesthesiology	.38	Pediatrics	.61
ISTP		**ISFP**		**INFP**		**INTP**	
Anesthesiology	2.05**	Anesthesiology	1.84*	Psychiatry	2.04***	Neurology	2.35**
OB Gyn	1.16	Gen Practice	1.40**	Pathology	1.49	Research	1.98**
Gen Practice	1.09	OB Gyn	1.17	Med. Faculty	1.31	Psychiatry	1.84***
Surgery	.98	Surgery	1.00	Internal Med	1.12	Pathology	1.78**
Internal Med	.86	Pediatrics	.94	Neurology	.94	Med. Faculty	1.41
Pediatrics	.72	Med. Faculty	.79	Research	.92	Internal Med	1.00
Med. Faculty	.61	Internal Med	.73	Gen Practice	.79	Surgery	.91
Psychiatry	.39**	Research	.66	Surgery	.76	Pediatrics	.90
Pathology	.33*	Pathology	.63	OB Gyn	.75	Gen Practice	.85
Research	.19	Psychiatry	.57	Anesthesiology	.69	Anesthesiology	.84
Neurology	.00	Neurology	.45	Pediatrics	.66	OB Gyn	.44***
ESTP		**ESFP**		**ENFP**		**ENTP**	
Surgery	1.38*	OB Gyn	1.44*	Psychiatry	1.52**	Pediatrics	1.24
OB Gyn	1.27	Surgery	1.21	Research	1.29	Internal Med	1.21
Gen Practice	1.17	Pediatrics	1.09	OB Gyn	1.28	Psychiatry	1.20
Pathology	1.00	Gen Practice	1.07	Pediatrics	1.23	Research	1.17
Neurology	.89	Anesthesiology	.85	Med. Faculty	1.22	Med. Faculty	1.05
Pediatrics	.88	Neurology	.77	Neurology	1.16	Pathology	1.04
Internal Med	.85	Internal Med	.76	Internal Med	.98	Surgery	1.00
Med. Faculty	.49	Research	.57	Surgery	.95	Anesthesiology	.84
Anesthesiology	.49	Pathology	.43	Pathology	.73	OB Gyn	.82
Research	.44	Med. Faculty	.43*	Gen Practice	.73*	Gen Practice	.70*
Psychiatry	.25**	Psychiatry	.33**	Anesthesiology	.56	Neurology	.34
ESTJ		**ESFJ**		**ENFJ**		**ENTJ**	
Gen Practice	1.46***	Pediatrics	1.51*	Med. Faculty	1.69*	Neurology	1.85
OB Gyn	1.37	Anesthesiology	1.26	Psychiatry	1.32	Med. Faculty	1.44
Pediatrics	1.19	Gen Practice	1.16	Pediatrics	1.16	Internal Med	1.35*
Surgery	1.16	Research	1.13	Gen Practice	.99	Pathology	1.30
Anesthesiology	1.01	Surgery	1.08	OB Gyn	.96	Psychiatry	1.18
Internal Med	.68*	OB Gyn	1.05	Surgery	.95	Research	1.14
Med. Faculty	.49	Internal Med	1.03	Internal Med	.83	Surgery	1.13
Pathology	.41	Med. Faculty	.85	Research	.81	Anesthesiology	1.02
Psychiatry	.36**	Neurology	.76	Pathology	.61	Gen Practice	.72
Research	.36	Pathology	.64	Anesthesiology	.60	Pediatrics	.72
Neurology	.00	Psychiatry	.16***	Neurology	.55	OB Gyn	.66

* $p < .05$ ** $p < .01$ *** $p < .001$

From Myers, I. B., & Davis, J. A., (September, 1964). Relation of medical students' psychological type to their specialties twelve years later. A paper presented at the annual meeting of the American Psychological Association, Los Angeles, CA.

Table 22.

Relative Attractiveness of the Specialties to Each of the Sixteen Types: 1980

SENSING TYPES

With thinking		With feeling	
ISTJ		**ISFJ**	
Pathology	1.74	Anesthes.	1.76
Obst., Gyn.	1.46		
Psychiatry	44		
ISTP		**ISFP**	
*Anesthes.	2.05	Anesthes.	1.84
*Psychiatry	.39	*Gen. Practice	1.40
Pathology	.33		
ESTP		**ESFP**	
Surgery	1.38	Obst., Gyn.	1.44
*Psychiatry	.25	Med. Faculty	.43
		*Psychiatry	.33
ESTJ		**ESFJ**	
**Gen. Practice	1.46	Pediatrics	1.51
Intern. Med.	.68	**Psychiatry	.16
*Psychiatry	.36		

INTUITIVES

With feeling		With thinking	
INFJ		**INTJ**	
Intern. Med.	1.42	*Neurology	2.75
		**Research	2.72
		*Pathology	1.99
		*Intern. Med.	1.44
INFP		**INTP**	
**Psychiatry	2.04	*Neurology	2.35
		*Research	1.98
		**Psychiatry	1.84
		*Pathology	1.78
		**Obst., Gyn.	.44
ENFP		**ENTP**	
*Psychiatry	1.52	Gen. Practice	.70
Gen. Practice	.73		
ENFJ		**ENTJ**	
Med. Faculty	1 69	Intern. Med.	1.35

Note: * significant at .01 level; ** significant at .001 level; others significant at .05 level

Gifts Differing **by Isabel Briggs Myers with Peter Briggs Myers. Palo Alto, CA: Consulting Psychologists Press, 1980.**

Table 23.

Relative Attractiveness of the Specialties to Each of the Sixteen Types: 1990

Sensing Types			
With Thinking		**With Feeling**	
ISTJ		**ISFJ**	
Pathology	1.74	Anesthesiology	1.76
Obstetrics, Gynecology	1.46		
Psychiatry	.44		
ISTP		**ISFP**	
Anesthesiology*	2.05	Anesthesiology	1.84
Psychiatry*	.39	General Practice*	1.40
Pathology	.33		
ESTP		**ESFP**	
Surgery	1.38	Obstetrics, Gynecology	1.44
Psychiatry*	.25	Medical Faculty	.43
		Psychiatry*	.33
ESTJ		**ESFJ**	
General Practice**	1.46	Pediatrics	1.51
Internal Medicine	.68	Psychiatry**	.16
Psychiatry*	.36		
Intuitive Types			
With Feeling		**With Thinking**	
INFJ		**INTJ**	
Internal Medicine	1.42	Neurology*	2.75
		Research**	2.72
		Pathology*	1.99
		Internal Medicine*	1.44
INFP		**INTP**	
Psychiatry**	2.04	Neurology*	2.35
		Research*	1.98
		Psychiatry**	1.84
		Pathology*	1.78
		Obstetrics, Gynecology**	.44
ENFP		**ENTP**	
Psychiatry*	1.52	General Practice	.70
General Practice	.73		
ENFJ		**ENTJ**	
Medical Faculty	1.69	Internal Medicine	1.35

Note: *significant at .01 level; **significant at .001 level; others significant at .05 level

Gifts Differing by Isabel Briggs Myers with Peter Briggs Myers. Palo Alto, CA: Consulting Psychologists Press, 2nd edition, 1990.

APPENDIX

Demographic Questionnaire:

Prior to the testing with psychometric instruments, the assigned faculty person will read separately each question privately to each subject, pausing for a response before reading the next question.

1. "Please state your ethnicity or race."
2. "Please state your gender."

After recording the responses, thank the subject for sharing the information.

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